

Food Technology Abstracts



Central Food Technological Research Institute, Mysore.

National Information System for Science and Technology
Department of Scientific and Industrial Research, New Delhi.

NICFOS

WHAT IS NICFOS

The National Information Centre for Food Science and Technology (NICFOS), is a discipline oriented information service in Food Science, Technology and Nutrition. Set up in October 1977 at the Central Food Technological Research Institute (CFTRI), Mysore, it is one of the Sectoral Information Centres under the NISSAT of the Govt. of India, Dept. of Scientific and industrial Research.

NICFOS's services are generated by a band of professional specialists and backed up by reprographic, micrographic, printing and computer facility. Its services include publication of R & D and industry oriented current awareness services, answering technical inquiries, reprography and training.

NICFOS BASE

The well-equipped Library of CFTRI with its collection going back to 1950 function as a clearing house for information on all aspects of food area. With its large collection of books, monographs, conference proceedings, bound volumes of periodicals, standards, patents, reports, theses, microforms and 600 current periodicals it can provide you with the latest information on any subject area of food. The library also serves as a training centre in different aspects of information handling and use besides guiding in setting up of new libraries in the area of food science and technology.

COMPUTERISED DATA-BASE SEARCH

The National Information centre for Food Science and Technology (NICFOS) at CFTRI, Mysore, has developed facilities for computerised "data-base search" of the world literature in Food Science and Technology and related disciplines. Retrospective search-service facility extending upto about 20 years is available on nominal payment basis. Titles alone or with abstracts can be requisitioned as per the needs of the intending users.

PHOTOCOPY (XEROX) OF PUBLISHED SCIENTIFIC/TECHNICAL ARTICLES

The National Information Centre for Food Science and Technology (NICFOS) at the Central Food Technological Research Institute, Mysore, has got a good collection of scientific and other periodicals collected over the years in the area of Biological Sciences. If any article is needed for reference work, we will supply one copy from our wealth of collections. The cost of providing the copies is Rs.2/- per page (minimum charge Rs.10.00). Please take advantage of this facility to overcome your problem in getting original articles.

All correspondences regarding these services should be addressed to:

*The Area Co-ordinator
FOSTIS, CFTRI,
Mysore 570 013,
Karnataka, India.*

FOOD TECHNOLOGY ABSTRACTS

Vol. 27 No. 7
July 1992

National Information Centre For Food Science And Technology
Central Food Technological Research Institute,
Mysore - 570 013, India

Compiled and Edited by

B. Vasu

C. S. Anita

Geetha Seetharam

Abstractors to FTA

AS	Author's Summary
BV	B. Vasu
CSA	C. S. Anita
GS	Geetha Seetharam
KAR	K. A. Ranganath
SD	S. Dhanaraj
SRA	S. R. Ananthnarayan
VKR	V. Krishnaswamy Rao

Computerisation and Database Creation

P. Manilal

C. S. Anita

B. Vasu

S. R. Ananthnarayan

Annual Subscription : Rs.250.00. US \$ 85.00. Single Copy : Rs.25.00

CONTENTS

	Page No
General	... 331
Food Processing	... 331
Food Packaging	... -
Food Engineering and Equipment	... 331
Energy in Food Processing	... -
Food Chemistry and Analysis	... 331
Food Microbiology and Hygiene	... 332
Biotechnology	... -
Tissue Culture	... -
Food Additives	... 333
Cereals	... 334
Millets	... 337
Pulses	... 339
Oilseeds and Nuts	... 341
Tubers and Vegetables	... 344
Fruits	... 346
Confectionery, Starch and Sugar	... 348
Bakery products	... 349
Milk and Dairy products	... 351
Meat and Poultry	... 354
Seafoods	... 356
Protein Foods	... 357
Alcoholic and Non-alcoholic Beverages	... 358
Fats and oils	... 359
Spices and Condiments	... 362
Sensory Evaluation	... 362
Food Storage	... 364
Infestation Control and Pesticides	... 364
Biochemistry and Nutrition	... 365
Toxicology	... -
Food Laws and Regulations	... 367
Author Index	... 369
Subject Index	... 377

ABBREVIATIONS

A	ampere	g	gram	qt	quart
AAS	atomic absorption Spectrometry	GC	gas chromatography	R	rontgen
abstr.	abstract	gn	gravity	rad	rad or radian
ad lib.	ad libitum	gal	gallon	ref.	reference(s)
ADP	adenosine diphosphate	gf	gram-force	rev/min	revolutions per minute
Anon.	Anonymous	GLC	gas-liquid chromatography	RH	relative humidity
AOAC	Association of Official Analytical Chemists	h	hour	RNA	ribonucleic acid(s)
approx.	approximately	ha	hectare	S.	south, Southern, etc.
atm	atmosphere	HDPE	high density polyethylene	s.d.	standard deviation
ATP	adenosine triphosphate	hl	hectolitre [100 l]	SDS	sodium dedecylsulphate
a _w	water activity	hp	horse power	s.e.	standard error
BHA	butylated hydroxyanisole	HPLC	high performance/pressure liquid chromatography	s	second [time]
BHT	butylated hydroxytoluene	HTST	high temperature short time	SNF	solids-not-fat
BOD	biological oxygen demand	Hz	hertz [frequency cycle/s]	sp., spp.	species
b.p.	boiling point	in	inch	sp.gr.	specific gravity
Btu	British thermal unit	IR	infrared	summ.	summary
c-	centi- [as in cm, cm ² , cm ³]	IU	international unit	Suppl.	Supplement
cal	calorie	J	joule	t	metric tonne
cd	candela	k-	kilo- [as in kcal, kg]	temp.	temperature
Cl	curie	K	Kelvin	TLC	thin layer chromatography
CMC	carboxymethyl cellulose	l	litre	TS	total solids
COD	chemical oxygen demand	lb	pound	UHT	ultra-high temperature
coeff.	coefficient	lb	pound-force	UV	ultraviolet
conc.	concentrated	LDPE	low density polyethylene	V	volt
concn.	concentration	m-	milli- [as in mg, ml, mm]	var.	variety
cv.	cultivar	m-equiv	milli-equivalent	vol.	volume
cwt	hundredweight	m	molar concentration	v/v	volume/volume
d-	deci-	M-	mega- [as in Mrad]	w	watt
DE	dextrose equivalent	max.	maximum	W.	West, Western, etc.
detr.	determination	min	minute [time]	WHO	World Health Organization
DFD	dark firm dry	min.	minimum	w/v	weight/volume
diam.	diameter	mol	mole	wk	week
dil.	dilute	mol.wt	.molecular weight	wt.	weight
DM	dry matter, Deutsche Mark	m.p.	melting point	yd	yard
DNA	deoxyribonucleic acid(s)	MPN	most probable number	yr	year
dyn	dyne	MS	mass-spectrometry	μ	micro- [as in g, m]
E.	East, Eastern, etc	n-	nano- [10 ⁻⁹ , as in nm]	%:	per centum
ECD.	electron capture detection	N	Newton [kg m/s ²]	>	greater than
EDTA	ethylenediaminetetra acetic acid	N.	North, Northern, normal concentration	>=	greater than or equal to;
ER	oxidation-reduction potential	NMR	nuclear magnetic resonance	<	less than
ELISA	enzyme-linked immunosorbent assay	NPU	net protein utilization	<=	less than or equal to;
f-	femto- [10 ⁻¹⁵ , as in fCi]	oz	ounce		not greater than
°F	degree Fahrenheit	p-	pico- [10 ⁻¹² , as in pCi]	Chemical symbols are used for all elements.	
FAO	Food and Agricultural Organisation	P	poise	ABBREVIATIONS FOR LANGUAGES	
FDA	Food and Drug Administration	p	probability	Language of text	
FD	flame ionization detection	Pa	Pascal [N/m ²]	Dutch	Nl
f oz	fluid ounce	PAGE	polyacrylamide gel electrophoresis	French	Fr
f.p.	freezing point	PER	protein efficiency ratio	German	De
f	foot, feet	p.p.b.	parts per billion	Italian	It
		p.p.m.	parts per million	Japanese	Ja
		PSE	pale soft exudative	Norwegian	No
		PTFE	polytetrafluorethylene	spanish	Es
		PVC	polyvinyl chloride	swedish	Sv
		PVDC	polyvinylidene chloride		

Chemical symbols are used for all elements.

ABBREVIATIONS FOR LANGUAGES

Language of text

Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
spanish	Es
swedish	Sv

GENERAL

1314

Pruthi (JS). **Need for updating agro-food production and processing technologies in India.** *Beverage and Food World* 18(4): 1991: 39-44

FOOD PROCESSING

1315

Roos (Y) and Karel (M). **Applying state diagrams to food processing and development.** *Food Technology* 45(12): 1991: 66, 68-71, 107

This article summarizes the results obtained from the state diagrams based on experimental and calculated data to characterize the relevant water content, temp. and time-dependent phenomena of amorphous food components. The applications of state diagrams in dehydration, crystallization of amorphous sugars and freezing and its use in the formulation of food products are also discussed. CSA

FOOD PACKAGING

Nil

FOOD ENGINEERING AND EQUIPMENT

1316

Spencer (G) and Thomas (R). **Fouling, cleaning and rejuvenation of formed-in-place membranes.** *Food Technology* 45(12): 1991: 98-99

Formed-in-place membranes which can be formed in place of permanent porous substrates, their performance restoration methods and its advantages are discussed in this article. CSA

1317

Phelps (BW). **Spiral-wound crossflow membrane element design for processing high-fouling solutions.** *Food Technology* 45(12): 1991: 101-106

This article deals with the improved design of spiral-wound ultrafiltration and reverse-osmosis membrane elements which allows their use in processing of high-fouling solutions. CSA

1318

Taoukis (PS), Fu (B) and Labuza (TP). **Time-temperature indicators.** *Food Technology* 45(10): 1991: 70, 72-82

Aspects covered in this article are the importance of temp. during food distribution, classification of indicators (critical temp. indicators, critical temp./time indicators and time-temp. indicators (TTI)), types of commercial TTIs (diffusion-based indicator, enzymatic indicator and polymerization reaction-based indicator), consumer-readable TTIs, correlation of TTIs with shelf-life (direct correlation and kinetic approach), application of TTIs (monitoring distribution, managing inventory, indicating quality on shelf-life and predicting food safety), limitations and potential solutions of TTIs (cost, reliability and applicability). CSA

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

1319

Kohler (B), Lambing (K), Neurohr (R), Nagl (W), Popp (FA), Wahler (J). **Photon emission - a new method for scanning the "quality" of food.** *Deutsche Lebensmittel-Rundschau* 87(3): 1991: 78-83 (De)

1320

Kulkarni (AS), Khotpal (RR), Lokhande (AR) and Bhakare (HA). **Glycolipid composition of subabul, ritha and kusum seed oils of Vidarbha region.** *Journal of Food Science and Technology (India)* 29(3): 1992: 179-181

The chloroform-methanol (2:1, v/v) extracted lipids from Subabul, (*Leucaena leucophala*), Ritha (*Sapindus mukorossi*) and Kusum (*Schleichera trifluga*) seeds were subjected to silicic acid column chromatography. The glycolipids obtained by acetone elution were separated by TLC into monoglucosyl diacylglycerol (MGDG) 22 to 28%, diglucosyldiacylglycerol (DGDG) 42 to 43%, steryl glucoside (SG) 13 to 16%, acylatedsterylglucoside (ASG) 14 to 17% and unidentified components 1 to 3%. The predominant fatty acids of individual glycolipids were found to be palmitic, stearic, oleic and linoleic acids. Glucose was identified as the sugar moiety in all the fractions. The ratio of sugar:sterol was 1:1 for SG and that of sugar:sterol:fatty acids was 1:1:1 for ASG. AS

1321

McGuire (J) and Krishdhasima (V). **Surface chemical influences on protein adsorption kinetics.** *Food Technology* 45(12): 1991: 92-96

Aspects covered in this article are protein adsorption (surface-induced conformational changes, bilayer adsorption, some consistent observations from adsorption equilibrium experiments and adsorption kinetic experiments), identifying rate constants (solid-surface chemical influences on β -lactoglobulin adsorption kinetics, quantifying molecular influences on protein adsorption kinetics) and optimizing surface-fluid contact. CSA

Chemistry (Analytical)

1322

Abdul-Hamid (J), Beh (SK), Donlan (AM), Moody (GJ) and Thomas (JDR). **Sterilization with /Sup 60/Cobalt γ -radiation of immobilised enzyme membranes for use in electrodes for food analysis.** *Journal of the Science of Food and Agriculture* 55(2): 1991: 323-326

1323

Karovicova (J), Polonsky (J) and Simko (P). **Determination of preservatives in some food products by capillary isotachopheresis.** *Die Nahrung* 35(5): 1991: 543-544

FOOD MICROBIOLOGY AND HYGIENE

1324

Arakawa (S), Ishihara (H), Nishio (O) and Isomura (S). **A sandwich enzyme-linked immunosorbent assay for k-carrageenan determination.** *Journal of the Science of Food and Agriculture* 57(1): 1991: 135-140

High titre antisera to k-carrageenan were produced by immunisation of rabbits and guinea pigs with k-carrageenan. These antisera, rabbit serum as a capture antibody and guinea pig serum as a detector antibody, were used in a sandwich enzyme-linked immunosorbent assay. The range of detn. of k-carrageenan was from 16 to 256 ng ml⁻¹ in the assay. The antisera showed no cross-reactivity with six thickeners. The assay was developed for application to foods such as jelly and custard pudding and demonstrated many advantages including high sensitivity, technical simplicity and the minimal requirement for food sample preparation before assay. AS

Enzymes

1325

Ohnishi (M), Iwata (K), Tomita (T), Nishikawa (U) and Hiromi (K). **Kinetic properties of the *Rhizopus* gluco-amylase and *Bacillus* α -amylase, which are immobilized on cellulofine.** *Starch/Starke* 42(12): 1990: 486-489

1326

Behnke (U) and Schonfeld (A). **Investigation on the storage stability of a pectic enzyme preparation by estimation of the inactivation velocity at elevated temperatures.** *Die Nahrung* 35(5): 1991: 525-531 (De)

The storage stability of pectic enzyme preparation is determined utilising the increased inactivation at elevated temp. The estimated velocity constants are extrapolated to storage temp. in an Arrhenius-diagram. This enables a prediction of the long term stability of polygalacturonase and the by-enzyme xylanase within a short time. For pectin esterase this procedure is not applicable because of divergent inactivation course. AS

Microorganisms

Bacteria

Lactobacillus casei

1327

Naes (H), Chrzanowska (J) and Blom (H). **Partial purification and characterization of a cell wall bound proteinase from *Lactobacillus casei*.** *Food Chemistry* 42(1): 1991: 65-79

The proteinase has pH optima at 4.8 using haemoglobin and at 5.6 with casein substrate, temp. optimum at 35 - 37 C, inactivation after 20 min at 50 C, mol. wt. 150 000, sodium dodecylsulphate-polyacrylamide gel electrophoresis indicating a tetrameric composition and isoelectric point 4.8. Serine proteinase inhibit this enzyme whose activity is affected by metal-chelating compounds. The ions Ca²⁺ and Co²⁺ enhance proteinase activity which is suppressed by Zn²⁺ and Cu²⁺. The proteinase without exhibiting peptidase activity, poorly degrades synthetic substrates of other serine proteinases. SD

Fungi

Mushrooms

1328

Akobundu (ENT) and Eluchie (GU). **Quality characteristics of pork sausage containing mushroom (*Pleurotus tuber-regium*) and local spices.** *Journal of Food Science and Technology (India)* 29(3): 1992: 159-161

The effects of incorporating *usu* mushroom (*Pleurotus tuber-regium*) flour and local spices [uzlza or West African black pepper (*Piper guineensis*) ehuru or West African nutmeg (*Monodora myristica*) and uda or Ethiopian pepper (*Xyloplea aethiopica*)] on the quality of cooked pork sausage were studied. Cooked pork sausages supplemented with 0 - 25% of *usu* mushroom flour were evaluated. Results revealed that *usu* mushroom incorporation increased cooking yield and ash content but decreased fat, protein, juiciness, colour, flavour and cohesiveness slightly. Objective textural evaluation with the Instron corroborated sensory results. The local spices did not affect sausage composition but produced acceptable and specific sausages. *Usu* mushroom incorporation up to 25% produced acceptable sausage. AS

1329

Basundhara Devi (Th) and Shantibala Devi (GA). **Nutrients in wild mushroom *Clitocybe multiceps* (Peck).** *Journal of Food Science and Technology (India)* 29(3): 1992: 189-190

Nutrients (proteins, amino acids, sugar, vitamins and fat) were estimated during the peak growing season from June to August in *Clitocybe multiceps*. The analyses were done separately on pileus and stipe which contain more of the nutrients. Pileus contains higher amounts of proteins, amino acids, ascorbic acid, thiamine and fat than the stipes, while sugar content is higher in stipes. Though the contents of nutrients in pileus and stipes are different, total contents of nutrients in mushroom are higher than other edible wood-rotting mushrooms of Manipur. AS

Hygiene

1330

Giese (JH). **Sanitation: The key to food safety and public health.** *Food Technology* 45(12): 1991: 74-80

This report discusses about the proper plant design for sanitation, the function and application of detergents (alkaline detergent, acid detergent and detergent auxiliaries), sanitizers, halogens and

surfactants (chlorine compounds, iodine compounds, quaternary ammonium compounds, acid-anionic sanitizers, and hot water and steam) and cleaning equipment and systems (manual aids, high pressure systems, foam cleaning systems, clean-out-of-place techniques, clear-in-place systems and sanitizer application equipment). It also discusses the impact that new products and processes have had on sanitary practices. CSA

BIOTECHNOLOGY

Nil

TISSUE CULTURE

Nil

FOOD ADDITIVES

Antioxidants

1331

Uhl (JC) and Eichner (K). **The effect of natural antioxidants on the stability of methyl linoleate in model systems.** *FAT Science Technology* 92(9): 1990: 355-361 (De)

This paper presents a model system based on linoleic acid methylester on potato starch which allows to estimate the antioxidative effects of certain additives in oxygen-sensitive foods of low lipid content. It is shown that a tocopherol mixture from natural sources (COvi-Ox T70) and an extract from rosemary (RM) were much more effective than the conventional ascorbyl palmitate (AP). So concn. of 2 p.p.m. COvi-Ox T70 or 20 p.p.m. RM respectively, were more effective than 200 p.p.m. AP. Reducing intermediates of the Maillard reaction (Amadori compounds) do not show antioxidative effects in all cases: in this investigations only fructose- γ -aminobutyric acid and fructose-arginine were able to retard linoleic acid oxidation to some extent; however, in the latter case, the free amino acid showed a similar effect. The antioxidative effect of the different additives tested is due to their radical scavenging character; only AP was able to reduce the hydroperoxides arising from autoxidation processes to the corresponding hydroxy compounds which cannot be decomposed to rancid products anymore. AS

Emulsifiers

Lecithin

1332

Penny (C). **Lecithin - nature's versatile emulsifier.** *Food* (5): 1991; 10, 12-15

CEREALS

1333

Klemm (H), Fretzdorff (B) and Bolling (H). **Evaluation of grain soundness using dehydrogenase activity determination.** *Getreide-Mehl und Brot* 44(11): 1990; 323-326 (De)

1334

Seibel (W). **3, DLG quality test of cereal based food.** *Getreide-Mehl und Brot* 44(11): 1990; 333-334 (De)

1335

Lupton (JR) and Yung (K-Y). **Interactive effects of oat bran and wheat bran on serum and liver lipids and colonic physiology.** *Cereal Foods World* 36(9): 1991; 827-831

Results of this study shows that the mixing of wheat bran with oat bran does not reduce the hypocholesterolemic effect of oat bran. Instead, the greater the amount of oat bran in the diet, the greater the hypocholesterolemic response. Similarly, any negative effects of oat bran on colonic physiology are not overcome by addition of wheat bran. Rather, the greater the amount of oat bran, the greater the hyperproliferative response. BV

Barley

1336

Anjum (FM), Ali (A) and Chaudhry (NM). **Fatty acids, mineral composition and functional (bread and chapathi) properties of high protein and high lysine barley lines.** *Journal of the Science of Food and Agriculture* 55(4): 1991; 511-519

Six barley lines derived from crosses involving Hiproly (SV 73608 x Mona 5) and Riso 1508 with higher yield recipients V 4342 and V 5681, along with the four parents, were analyzed for fatty acids and mineral composition. Dough properties, bread and chapathies were characterized by blending barley line (B 82503) at 2.5 - 25% with bread wheat flour (Pak 81). Fatty acid contents were myristic acid, 0.60 - 1.16%; palmitic acid, 16.68 - 20.84%; stearic acid, 1.30 - 3.33%; oleic acid 16.19 - 19.11%;

linoleic acid, 50.13 - 57.67%; linolenic acid 5.90 - 8.33% and degree of unsaturation 1.40 - 1.50%. The derived lines contained similar amounts of essential fatty acids. Significant variation for Mg, Cu, Zn, P and K was observed but overlapped among the lines and parents. The Ca, Fe and Mn showed non-significant differences among lines and parents. Blending up to 10% barley flour with bread wheat flour gave farinograph characteristics comparable to those of pure wheat flour, but increasing the proportion of barley beyond this decreased the mix time and dough stability. Bread baking tests verified that up to 10% barley could be mixed with wheat without adversely affecting loaf volume and other quality attributes. For chapathi making up to 20% barley could be blended into the wheat, yet yield acceptable quality. AS

Oats

1337

Shinnick (FL), Mathews (R) and Ink (S). **Serum cholesterol reduction by oats and other fiber sources.** *Cereal Foods World* 36(9): 1991; 815-821

This paper presents an overview of the effects of dietary fiber and fiber sources on serum cholesterol concn., with emphasis on the results of human clinical studies of oats and oat bran. 102 references. BV

Rice

1338

Noomhorm (A) and Yubai (C). **Effect of tropical environmental conditions on rice kernel breakage during milling.** *Journal of the Science of Food and Agriculture* 55(4): 1991; 521-528

Rough rice (*Oryza sativa* L. Suphan-60 var. of Thailand) samples subjected to environmental conditions of 20 - 35 C and RH of 40 - 90% during milling showed that the head rice yield (3.5, 1.26 and 1.65%) decreased with increase in milling environment temp. at different RH (40, 60 and 80% respectively) conditions. The results also showed that the highest head rice yield of 55.30 - 56.01% were obtained at 70 - 80% RH and in the range of 20 - 25 C temp. During tempering treatment kernel temp. rise during milling was reduced by 2.2 C and 2.87 C for 2 and 3 passes, respectively, a head rice yield increase of 0.95 - 1.12% was observed. Increasing the number of passes from 1 - 3 during milling results in a lower kernel temp. rise and higher yield of 2.08 and 1.30% for with and without tempering respectively. BV

Rice bran

1339

Saeki (A). **Production of rice vinegar from uncooked rice bran by a parallel-combined process consisting of saccharification, ethanol fermentation and acetic acid fermentation.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(5): 1991: 418-421 (Ja)

An improved method was developed for production of rice vinegar from uncooked ricebran by a parallel-combined process consisting of enzymatic saccharification, ethanol fermentation with acetic acid tolerant fermentation with acetic acid tolerant yeast and acetic acid fermentation with acetic acid bacteria. An acid stable glucoamylase from *Rhizopus* sp. which is able to produce glucose enzymatically from raw starch in the presence of acetic acid was chosen for the purpose. In addition to a common acetic acid bacteria, *Saccharomyces ludwigii* which demonstrates a normal ability of ethanol fermentation in 1% acetic acid was selected as an acetic acid tolerant yeast. In the actual process of rice vinegar fermentation, these three independent steps were allowed to act at a time in one mash batch containing 12-14% (w/v) of uncooked rice-bran, and incubation was carried out as static culture through the process. As a result, the newly developed method was evaluated to be superior to classic conventional methods on the acetic acid yield. AS

Rice starch

1340

Ragheb (A), Refai (R), Abd El-Thalout (I) and Hebeish (A). **The combined effect of oxidation and carbamoylethylation on the rheological properties of maize and rice starches.** *Starch/Starke* 42(11): 1990: 420-426

The combined effect of oxidation and etherification on the mol. structure of starch was investigated. Maize and rice starches were used. Oxidation was affected using sodium hypochlorite while etherification was performed by reacting starch with acrylamide in presence of sodium hydroxide; this reaction is known as carbamoylethylation. The extent of the latter, expressed as % N, was found to increase by decreasing the mol. size of starch through oxidation. The carbamoylethyl starches so obtained could be precipitated by ethanol and they are soluble in water irrespective of the kind of starch. On the other hand, results of rheological properties indicated that they are governed mainly by the mol. size of starch. Oxidized starches with relatively high mol. size exhibit thixotropic behaviour. The degree

of thixotropy decreases and changes into pseudoplasticity as the mol. size of starch decreases. The results also indicated that at constant rate of shear the apparent viscosity of carbamoylethyl starches decreases as the mol. size decreases. Furthermore, the rheological properties of carbamoylethyl starch pastes undergo considerable changes and so does the apparent viscosity when these pastes were stored for 3 days. AS

Rye

Rye flour

1341

Dorfer (J). **Rheological investigations with rye flour-suspensions and application of hemicellolytic enzymes.** *Getreide-Mehl und Brot* 44(11): 1990: 330-332 (De)

Wheat

1342

Perkowski (J), Chelkowski (J) and Wakulinski (W). **Mycotoxins in cereal grain. Part 13. Deoxynivalenol and 3-acetyl-deoxynivalenol in wheat kernels and chaff with head fusariosis symptoms.** *Die Nahrung* 34(4): 1990: 325-328

1343

Chelkowski (J), Cierniewska (A) and Wakulinski (W). **Mycotoxins in cereal grain. Part 14. Histochemical examination of Fusarium-damaged wheat kernels.** *Die Nahrung* 34(4): 1990: 357-361

1344

Edwards (JP), Short (JE) and Abraham (L). **Large-scale evaluation of the insect juvenile hormone analogue fenoxycarb as a long-term protectant of stored wheat.** *Journal of Stored Products Research* 27(1): 1991: 31-39

Wheat grains treated with fenoxycarb (at 4.2 or 8.2 mg/kg a.i) and chlorpyrifos-methyl (at 3.9 mg/kg a.i) were infested with 300 adults of each of *Tribolium castaneum*, *Oryzaephilus surinamensis*, *Rhyzopertha dominica* and *Sitophilus granarius* at 0, 6, 12 and 18 months. Grain samples were examined at 3 month intervals for the presence of insects, grain quality and the level of pesticide residue in the grain. The grain samples were also assessed for milling and baking quality and insecticide residues in white flour, bran and baked white bread. Chlorpyrifos-methyl treated grain controlled *O. surinamensis* for 9 months, *R. dominica* and *T. castaneum* for 12 months, and *S. granarius* for 15 months. Grains treated with fenoxycarb at 4.2

mg/kg controlled populations of *O. surinamensis*, *R. dominica* and *T. castaneum* for 2 yr, but was not completely effective at controlling populations of *S. granarius*. Grain treated with fenoxycrab at 8.2 mg/kg controlled populations of all 4 sp. for the entire 2 yr period of the trail. Grain quality and breadmaking properties were good when insect population were kept low. Chlorpyrifos-methyl and fenoxycrab residues were low in white flour and baked white bread, but residues were markedly higher in bran. BV

1345

Kaushal (KS) and Ashok (KS). **Effect of *Sitophilus oryzae* infestation on *Aspergillus flavus* infection and aflatoxin contamination in stored wheat.** *Journal of Stored Products Research* 27(1): 1991: 65-68

Moisture content, *Aspergillus flavus* infection, and aflatoxin production were investigated in 6.5 kg lots of wheat infested by *Sitophilus oryzae* and/or *A. flavus* at harvest and during 3 months storage in metal pots. The grain moisture content and *A. flavus* infection rates increased throughout the storage period and were greatest in wheat lots infested with both *S. oryzae* and *A. flavus*. Insect infestation correlated with increased aflatoxin production. Toxin producing strains of *A. flavus* were isolated from wheat grains and internally from the weevils. AS

1346

Hocking (AD) and Banks (HJ). **Effects of phosphine fumigation on survival and growth of storage fungi in wheat.** *Journal of Stored Products Research* 27(2): 1991: 115-120

Moist wheat grain (a_w 0.80, 16.2% moisture content (mc) and 0.86 a_w , 18.3% mc) inoculated with *Eurotium chevalieri*, *Aspergillus flavus* or *Asp. parasiticus* was exposed to 0.1 g phosphine m^{-3} for 2 wks at 28 C. Most fungi showed less development in phosphine fumigated wheat than air during storage. The level of inhibition observed suggests that phosphine may be useful in retarding fungal spoilage during short-term storage of high moisture grain (15 - 19% m.m for wheat). Phosphine at 0.1 g m^{-3} caused only a slight decrease in populations of fungi that were unable to grow at the a_w of the stored grain, indicating that phosphine has only a small effect on non-growing mycelium and dormant conidia. BV

1347

Singh (PP), Battu (RS), Joia (BS) and Kalra (RL). **Absorption of DDT and HCH residues by wheat during storage in rural houses treated with these**

insecticides for malaria control. *Journal of Stored Products Research* 27(2): 1991: 131-134

Wheat kept in gunny bags of 20 kg capacity in rural houses sprayed with DDT and HCH for mosquito control was found to acquire the residues of these insecticides up to 4.40 or 22.14 mg kg^{-1} , respectively, during an 8 month storage period. Wheat stored in sealed polyethylene bags of 20 kg capacity also absorbed residues of these insecticides up to 3.17 and 14.12 mg kg^{-1} , respectively. Samples kept in gunny or polyethylene packets of 100 g capacity absorbed DDT and HCH residues at levels higher than those kept in bags of 20 kg size. This may be due to their relatively large surface area available for exposure to the ambient environment. Absorption of residues of DDT and HCH by wheat stored in sealed polyethylene bags suggests that considerable transference of these insecticide residues can occur through vapour phase. Thus, the potential exists for the contamination of food commodities with substantial amounts of residues during their storage in rural premises treated with insecticides for malaria control and this may have significant implications in the regulation of insecticide residues in foods. AS

1348

Bryden (WL), Mollah (Y) and Gill (RJ). **Bioavailability of biotin in wheat.** *Journal of the Science of Food and Agriculture* 55(2): 1991: 269-275

The bioavailability of biotin in wheat was determined by ileal digestibility in chickens. Only less than or equal to 12% of the vitamin was available in a range of wheat cvs, in contrast to almost 100% in maize. Grinding wheat or adding oat hulls to a wheat-based diet did not improve the digestibility. The low digestibility of biotin was not associated with the biotin concn., or other characteristics of the wheat grain. It was concluded that low availability in wheat results from the inability of birds to liberate biotin from wheat in a form suitable for absorption. AS

1349

Manju Gupta, Neelam Khetarpaul and Chauhan (BM). **Effect of Rabadi fermentation of HCl-extractability of minerals of wheat.** *Food Chemistry* 42(1): 1991: 111-117

Freshly ground wheat flour-buttermilk mixture fermentation at 30 - 40 C, 6 - 48 h showed that temp. of fermentation and HCl extractability of minerals increased with period, and non-phytate P and inorganic P concn. in fermented product increased with decreased phytate P. Phytic acid and HCl-extractability of minerals showed significant negative correlation. SD

1350

Weipert (D). **Continuous assessment of rheological properties of wheat doughs during heat setting as a recording baking test.** *Getreide-Mehl und Brot* 44(8); 1990; 227-231 (De)

1351

Zwingelberg (H). **Colour measurement of durum wheat and milled products from durum wheat.** *Getreide-Mehl und Brot* 44(11); 1990; 339-345 (De)

1352

Grestenkorn (P). **Correlation between colour measurement and quality criterions of durum wheat.** *Getreide-Mehl und Brot* 44(11); 1990; 350-351 (De)

Wheat flour

1353

Prugarova (A) and Kovac (M). **Investigation on lead and calcium binding to gluten proteins of wheat flour.** *Die Nahrung* 34(1); 1990; 103-104

1354

Nierle (W), El Baya (AW) and Brummer (J-M). **Effect of emulsifying lipids on baking quality of wheat flour.** *Getreide-Mehl und Brot* 44(11); 1990; 327-330 (De)

Wheat starch

1355

Nierle (W) and El Baya (AW). **Lipids and rheological properties of starch. Part II. The effect of granule surface material on viscosity of wheat starch.** *Starch/Starke* 42(12); 1990; 471-475

1356

Nierle (W) and El Baya (AW). **Lipids and rheological properties of starch. Part I. The effect of fatty acids, monoglycerides and monoglyceride ethers on pasting temperature and viscosity of wheat starch.** *Starch/Starke* 42(7); 1990; 268-270

MILLETS

Corn

1357

Dendy (J), Dobie (P), Saidi (JA), Smith (J) and Uronu (B). **Trials to assess the effectiveness of new synthetic pheromone mixtures for trapping (*Prostephanus truncatus* (Horn))**

(Coleoptera-Bostrichidae) in maize stores. *Journal of Stored Products Research* 27(1); 1991; 69-74

Traps containing pheromone ((1-methylethyl (E)-2-methyl-2-pentenoate) (T₁) and oate) (T₂) mixtures had trapped more beetles than those containing T₁ alone although significant differences could not be shown between any of the mixtures tested. The current monitoring system could possibly be improved by using a mixture of T₁ and T₂ as the pheromone lure. T₁ was released faster from the vials than T₂, but at least 10% of each component remained after 2 wks exposure. It is however recommended that lures were renewed every 2 wks when used with *P. truncatus* trap. BV

1358

Li (Li) and Arbogast (RT). **The effect of grain breakage of fecundity, development, survival and population increase in maize or *Tribolium castaneum* (Herbst) (Coleoptera: Tenebrionidae).** *Journal of Stored Products Research* 27(2); 1991; 87-94

The intrinsic rate of increase in a field population of *Tribolium castaneum* on undamaged grain, commercial grain, cracked grain and maize flour was estimated at 30 C, 75% rh. Egg production of *T. castaneum* on the above media was significantly different and the ranking can be expressed as flour > cracked maize > commercial maize > undamaged maize. Developmental rates and survival rates were significantly higher on flour and cracked maize than on commercial grain and undamaged grain. On commercial grain, populations could increase twenty times per generation. Although damage to grain is not absolutely necessary for young larvae to survive and for females to lay eggs, fecundity was reduced to a min., survival was very low, and development was delayed on undamaged grain. Population increase would thus be so reduced that populations may decline to extinction. Previous infestation by other species may help initial infestation of whole kernels by *T. castaneum*, although the results of this study showed that *T. castaneum* can develop on whole maize kernels alone under optimal conditions. AS

1359

Throne (JE). **Equilibrium moisture content of cracked and whole corn (maize).** *Journal of Stored Products Research* 27(2); 1991; 129-130

The equilibrium moisture contents of finely cracked; medium cracked; coarsely cracked; whole damaged; and whole, undamaged corn kernels were determined at 43 and 75% RH and 30 C. Cracked and whole corn equilibrated to the same moisture

contents. This indicates that differences in progeny production of *Cryptolestes ferrugineus* in an earlier study were not caused by differences in equilibrium moisture content of the types of corn used. AS

1360

Coulter (LA) and Lorenz (K). **Extruded corn grits-quinoa blends: I. Proximate composition, nutritional properties and sensory evaluation.** *Journal of Food Processing Preservation* 15(4): 1991: 231-242

Quinoa blended with corn grits at 10, 20 and 30% levels produced unprocessed and extruded products with higher protein, fiber, ash, amino acids; greater nitrogen solubility, lower *in vitro* digestibility and acceptability. SD

1361

Coulter (LA) and Lorenz (K). **Extruded corn grits-quinoa blends: II. Physical characteristics of extruded products.** *Journal of Food Processing Preservation* 15(4): 1991: 243-259

Blending of quinoa with corn grits at 10, 20 and 30% levels extruded at 15 and 25% moisture using screws with 1:1 and 3:1 compression ratio indicated that 15% initial moisture and 3:1 compression ratio gave favourable products with greater expansion, lower density and shear strength. Scanning electron microscopy, the blended product (with 30% quinoa) showed a rough texture, many broken cell walls and less evenly distributed air cells. SD

1362

Bressani (R). **Protein quality of high-lysine maize for humans.** *Cereal Foods World* 36(9): 1991: 806-811

This review covers essential amino acid content in normal and high-lysine maize, protein quality of high-lysine maize in human subjects (N balance in children and adult), protein quality values in human subjects, growth studies and nutritional benefits of improved protein quality of maize and acceptability and nutritional impact. 39 references. BV

Corn starch

1363

Sreenath (HK) and BeMiller (J). **Effect of pullulanase and α -amylase on hydrolysis of waxy corn starch.** *Starch / Starke* 42(12): 1990: 482-486

Using commercial pullulanase, α -amylase and their mixture, partial hydrolysis of waxy corn starch was characterised for optimising production of

maltodextrins free of D-glucose. Compared to pullulanase or α -amylase alone, the mixture of these two (simultaneous or successive addition) on the substrate enhanced the efficiency of maltodextrin turnover with low or traces of D-glucose production in a short time. D-glucose was removed from dextrins by membrane filtration and the yield of dextrin above DP6 was 60 - 65%. AS

1364

Komiya (T), Yamada (T), Imai (K), Hisamatsu (M), Masui (H), Kawakishi (S). **Study on interaction of corn starch and γ -cyclodextrin with lipid peroxide.** *Starch / Starke* 42(10): 1990: 394-397

The deterioration of corn starch and γ -cyclodextrin (γ -CD) as a model compound by coexisting of methyl linolate (ML) has been studied in the solid system. With the elapse of oxidation time of ML, the reducing values of above the sugars increased and the value of γ -CD with Silica Gel done more largely than without the one. The mol. wt. of corn starch may decrease slightly, the glycosidic linkages of amylopectin and amylose molecules in the starch may be cleaved partially and the crystalline structure of the starch will be deteriorated a little by some active radicals formed by the autoxidation of ML. The propagative autoxidation of ML induced the deterioration of γ -CD giving the two processes of the hydrolysis and the depolymerization in the similar way as observed in the reaction of γ -CD with OH radicals. AS

Pearl millet

1365

Kheterpaul (N) and Chauhan (BM). **Effect of natural fermentation on phytate and polyphenolic content and *in vitro* digestibility of starch and protein of pearl millet (*Pennisetum typhoides*).** *Journal of the Science of Food and Agriculture* 55(2): 1991: 189-195

Natural fermentation at 20, 25 and 30 C for 72 h brought about a significant reduction in phytic acid content of pearl millet (*Pennisetum typhoides* Rich) flour. The phytate content was almost eliminated in the flour fermented at 30 C. An increase in polyphenol content of fermented flour was noticed, the higher the temp. of fermentation the greater was the increase in polyphenol content of pearl millet. An improvement in starch as well as protein digestibility (*in vitro*) was noticed at all the temp. of natural fermentation, the highest being at 30 C. AS

Sorghum

1366

Satish Kumar (L), Prakash (HS), Shetty (HS) and Malleshi (NG). **Influence of seed mycoflora and harvesting conditions on milling, popping and malting qualities of sorghum (*Sorghum bicolor*)**. *Journal of the Science of Food and Agriculture* 55(4): 1991: 617-625

Grains of sorghum cvs (SPV-386, SPV-475, CSH-9 and CSH-5) harvested at physiological maturity stage possessed superior malting and milling qualities whereas late-harvested grains exhibited better popping characteristics. Milling and popping reduced the seed mycoflora (*Fusarium moniliforme*) considerably. BV

PULSES

1367

Kotaru (M), Iwami (K), Yeh (H-Y) and Ibuki (F). **Resistance of cranberry bean (*Phaseolus vulgaris*) α -amylase inhibitor to intraluminal digestion and its movement along rat gastrointestinal: Further investigation using a radioactive probe and specific antiserum**. *Food Chemistry* 42(1): 1991: 29-37

Cranberry bean (*Phaseolus vulgaris*) α -amylase inhibitor (CBAI) was treated with [14 C]HCHO and NaBH₄ for modification of lysyl E-amino group and its reductive methylation did not affect the susceptibility to digestive enzymes and its immunoreactivity with rabbit antiserum. The bulk of the inhibitor without undergoing digestion, absorption, much loss of antigenicity and radioactivity, passed through the small intestine. SD

1368

Emefu (EE), Ojimelukwe (PC) and Mbata (GN). **Effect of insect infestation on the proximate composition and functional properties of flour samples and protein isolates from bambarra groundnut and cowpea**. *Journal of Food Science and Technology (India)* 29(3): 1992: 174-176

The proximate composition of flour samples obtained from infested and uninfested cowpea *Vigna unguiculata* and bambarra groundnut *Voandzela subterranea* seeds were determined. The results revealed that infested flour sample from both seeds had lower protein and fat contents but higher ash content than uninfested samples. The emulsion capacity, foam capacity and foam stability of the flour, protein isolates and protein fractions of

uninfested cowpea demonstrated better emulsification and foaming characteristics than those of bambarra groundnut. In all cases, insect infestation seeds reduced the foaming and emulsification properties of flours. AS

1369

Lombardi-Boccia (G), Lullo (GD) and Carnovale (E). **In vitro iron dialysability from legumes: Influence of phytate and extrusion cooking**. *Journal of the Science of Food and Agriculture* 55(4): 1991: 599-605

In vitro iron dialysability from five Italian legumes (mottled bean, white bean, faba bean, chickpea, lentil) and the influence of phytate and extrusion cooking on it were evaluated. Iron dialysability was 2.3 and 2.4% in mottled and white bean respectively, 1.2% in faba bean, 2.7% in chickpea and 1.1% in lentil. After extrusion cooking the flours showed a marked iron contamination and a decrease in iron dialysability, but these changes were significant only for mottled bean. Enzymic phytate removal induced an increase in iron dialysability > 100% in all the raw legumes except mottled bean which showed an increase of only 57%. This finding indicates that, although phytate consistently modifies iron dialysability, it is difficult to identify a quantitative relationship between phytate content and iron dialysability. AS

1370

Ashenafi (M) and Busse (M). **Growth potential off *Salmonella infantis* and *Escherichia coli* in fermenting tempeh made from horsebean, pea and chickpea and their inhibition by *Lactobacillus plantarum***. *Journal of the Science of Food and Agriculture* 55(4): 1991: 607-615

Salmonella infantis and *Escherichia coli* multiplied to varying degrees during the fermentation of unacidified horsebean, pea and chickpea tempeh. Active mycelial growth on the beans resulted in a sharp increase in pH. This was always accompanied by a sharp increase in the growth rate of the test organisms. Acidification of the beans during soaking decreased the growth rate of the test organisms only until active mycelial growth started. Inoculation of cooked beans with *Lactobacillus plantarum* resulted in a complete inhibition of *E. coli* in unacidified and acidified chickpea tempeh and acidified pea tempeh. Marked inhibition of *E. coli* was also noted in unacidified pea tempeh and acidified horsebean tempeh. *S. infantis* was also completely inhibited by *L. plantarum* in unacidified and acidified chickpea tempeh. In pea and horsebean tempeh, counts of *S. infantis* were always lower in *lactobacillus*-inoculated fermenting beans than in the control. Beside the pH, undissociated

acids and other substances produced by *L. plantarum* may be inhibitory to the test organisms. The use of *L. plantarum* may be considered for the control of pathogens during commercial-scale tempeh production. AS

1371

Simmi Dhawan and Gurmukh Singh. **Studies of sev preparation from blends of Bengal gram flour, defatted soy flour and rice flour.** *Beverage and Food World* 18(4): 1991: 18-20

Chickpea

1372

Umaid Singh, Subrahmanyam (N) and Jagdish Kumar. **Cooking quality and nutritional attributes of some newly developed cultivars of Chickpea (*Cicer arietinum*).** *Journal of the Science of Food and Agriculture* 55(1): 1991: 37-46

Kabuli (cream seed coat) cv was generally preferred to desi (brown seed coat) cv in terms of cooking time and sensory properties. Ca content was noticeably higher in desi than in kabuli cvs, whereas Mg, Fe, Cu, and Zn showed no definite trend. Lysine, threonine, methionine and cysteine of these genotypes were within the range of FAO values. Desi and Kabuli showed no noticeable difference in protein and amino acids. Biological value was considerably higher for Kabuli than for desi; and contained more utilisable protein and may be nutritionally better than desi. BV

Faba beans

1373

Schmandke (H), Schultz (M), Schmidt (G), Schneider (Ch) and Andersson (O). **Tension of oil-water interface and properties of O/W emulsions in dependence of faba bean globulins.** *Die Nahrung* 34(4): 1990: 363-368

Compared with faba bean globulin the improved flow, gelifying, surface and emulsifying properties of aqueous solution of the corresponding acetylated derivatives are reflected in O/W emulsions by their enhanced stability. AS

1374

Schwenke (KD), Prah (L), Danilenko (AN), Grinberg (VJ) and Tolstoguzov (VB). **'Continuous' conformational change in succinylated faba bean protein isolates.** *Die Nahrung* 34(4): 1990: 399-401

1375

Donath (R) and Kujawa (M). **Study on the degradation of vicin and convicin in *Vicia faba* flour by selected bacteria strains.** *Die Nahrung* 35(5): 1991: 449-453 (De)

Three hour incubation of *Vicia faba* with *Streptococcus faecalis* convicin was converted completely and vicin to about 95%. BV

Lupins

1376

Jimenez (MD), Cubero (JI) and De Haro (A). **Genetic and environmental variability in protein, oil and fatty acid composition in high-alkaloid white lupin (*Lupinus albus*).** *Journal of the Science of Food and Agriculture* 55(1): 1991: 27-35

1377

Zaror (VG), Acevedo (GB), Soto (EY) and Imbarack (RU-D). **Tolerance and chronic acceptability evaluation of lupin (*Lupinus albus* var. Multolupa) flour in young adults.** *Archivos Latinoamericanos de Nutricion* 40(4): 1990: 490-502 (Fr)

Cookies enriched with sweet lupin flour were tested for their acceptability and tolerance in young adults, and compared with control cookies. A number of hematological, hepatic and renal tests were performed, as well as the measurement of allergic response, in order to detect possible changes induced by lupin. The study included 31 young adults assigned to two groups which comprised males and females, with mean ages of 26 plus or minus 6.5 and 27 plus or minus 5.9 yr respectively. The protein and energy intakes of the subjects were calculated, prior to the study, using the methods of dietary history and the 24 h recall method. The subjects were free of any abnormalities detectable by medical history, physical examination, biochemical and hematological tests. Body wt. and height were measured before the beginning of the study. The ratio wt./height of the individuals was calculated using the Jelliffe's standards. The mean values for the calorie and protein intakes were 1,919 kcal (SD plus or minus 655) and 59.3 g (SD plus or minus 22.7). The calorie contents of the control and experimental cookies were 507 and 610 kcal respectively, while the protein contents were 8.4 g and 24.1 g, respectively. The body wt. of subjects in both groups increased significantly during the study ($P < 0.01$ and $P < 0.02$). No significant changes were recorded for other anthropometric parameters, except for the tricipital skinfold ($P < 0.01$). Changes observed in hematological parameters were judged to be unrelated to lupin flour. The acceptability and tolerance to high levels of lupin flour were good. The above-mentioned results show that sweet lupin flour

is a good and safe source of energy and protein for adults. AS

Winged beans

1378

Gatehouse (AMR), Howe (DS), Flemming (JE), Hilder (VA) and Gatehouse (JA). **Biochemical basis of insect resistance in winged bean (*Psophocarpus tetragonolobus*) seeds.** *Journal of the Science of Food and Agriculture* 55(1): 1991: 63-74

Insect *Callosobruchus maculatus*) feeding trials were carried out in which winged bean seed protein fractions were incorporated at a range of concn. into artificial seeds, and their effects on the development of *C. maculatus* was studied. Both albumin and globulin fractions were found to be toxic to the developing larvae and their toxicity correlated with their hemagglutinating activity. Assay of psophocarpin A, B and C fractions demonstrated that psophocarpin B to be the most insecticidal and to contain the highest haemagglutinating activity. Purified basic seed lectin was highly insecticidal to *C. maculatus* larvae, with an LC_{50} value of C. 3.5 g kg^{-1} . Winged bean trypsin inhibitor had no deleterious effects upon development. BV

OILSEEDS AND NUTS

Coconuts

1379

Leufstedt (G). **Opportunities for future diversification of the coconut industry.** *Oleagineux* 45(11): 1990: 505-508

This paper presents alternatives for a diversification of the coconut industry into new food products. Aspects covered include: coconut industry, coconut oil, desiccated coconut, coconut milk, high value coconut products and hygienic processing of coconuts. BV

Mustard

1380

Aguilar (C), Rizvi (SSH), Ramirez (JF) and Inda (A). **Rheological behaviour of processed mustard. I. Effect of milling treatment.** *Journal of Texture Studies* 22(1): 1991: 59-84

Slightly coarse, standard and fine samples of processed mustard showed unimodal population based particle size distributions described by the population mode but on volume basis bimodal

distributions described by their population-mode (smaller size group of particles) and the volume mode (larger size). Coarser sample showed larger size volume mode, higher apparent viscosity of nonmixed samples, Bingham yield stress and plastic apparent viscosity, shear stress constant and coeff. of thixotropic breakdown from the Weltman stress decay model, yield stress and consistency index from the Herschel-Bulkley mode and storage and loss moduli which can show the effect of manufacturing practices on long term storage stability of the product. SD

1381

Aguilar (C), Rizvi (SSH), Ramirez (JF) and Inda (A). **Rheological behaviour of processed mustard. II. Storage effects.** *Journal of Texture Studies* 22(1): 1991: 85-103

Slightly coarse, standard and fine samples of processed yellow mustard were stored at 5, 25 and 45 C for 3 months at 45 C caused in all the samples syneresis and aggregation of colloidal particles. The fine sample showed in syneresis even at 25 C. Increase in population mode increased apparent viscosity, flow behaviour index from the Herschel-Bulkley model and exponent from the loss modulus power law equation, and decreased Bingham yield stress, plastic apparent viscosity, shear stress constant from the Weltman stress decay model, yield stress, and consistency index, exponent from the storage modulus power law equation and min. values of loss tangent. In heterodisperse semi-solid foods the syneresis which is time and temp. dependent may be minimized by particle size distribution. SD

Rapeseeds

1382

Klepacka (M). **Infrared spectroscopic study of interactions between phytate and protein in rapeseed.** *Acta Alimentaria* 19(4): 1990: 295-304

Extracts (0.2% NaOH), supernatants and isolates were prepared from meals of three varieties of rapeseed (classical, low erucic acid and double improved) and were used to study the interaction between protein and phytates by infrared spectroscopy. Significant differences in the intensity band at 1090 cm^{-1} in the IR spectra of samples were observed. This may be attributed to the effect of the combination of P with negatively charged proteins. Protein complexed with phytates appeared both in basic (pH 9.5) and acid environments (supernatants II pH 3.0 - 4.1). AS

1383

Kozłowska (H), Zadernowski (R), Nowak (H) and Piaskula (M). **The influence of selected technological processes on the improvement of rapeseed meal and flour feed quality. Part I. The influence of hydrothermal treatment and ethanol extraction on chemical composition of rapeseed products.** *Die Nahrung* 35(5): 1991: 485-489

As the majority of noxious compounds in rapeseed (glucosinolate, phenolic compounds and other non-investigated ones) are well soluble in alcohol, an attempt was made to establish to which extent it is possible to eliminate these compounds from flour with 80% alcohol and to which extent hydrothermal treatment increases the extraction efficiency. The results of the chemical composition of the differently treated products from the double-improved Jantar var. show, that hydrothermal treatment of whole seeds results in easier extraction of the major part of the compounds analysed. But under the influence of the applied processes protein denaturation changes may take place. AS

Rapeseed flour

1384

Mothes (R), Schwenke (KD) and Grossmann (S). **Modified method of phytic acid analysis in rapeseed flour.** *Die Nahrung* 34(1): 1990: 99-101

Rapeseed proteins

1385

Mothes (R), Schwenke (KD), Zirwer (D) and Gast (K). **Rapeseed protein - polyanion interactions. Soluble complexes between the 2 S protein fraction (napin) and phytic acid.** *Die Nahrung* 34(4): 1990: 375-385

The formation of electrostatic complexes between the low molecular mass basic rapeseed protein fraction (napin) and phytic acid was studied using turbidity, potentiometry, gel chromatography, gel electrophoresis, dynamic light scattering and circular dichroism spectroscopy. In the first step insoluble "substoichiometric" complexes are formed in which the positive charge of the protein are not completely neutralized. Soluble negatively charged oligomeric complexes are formed with an excess of phytic acid. Protein dimers dominate over the monomer and small amounts of higher oligomers. Dimers and larger soluble aggregates are the main components after heating. The critical phytic acid-protein ratio for solubilizing the system represents the threshold value for the heat-stabilizing effect of phytic acid. Complexing with phytic acid does not influence significantly the secondary structure of the protein. Buffers and

neutral salts weaken the phytic acid binding to the protein and decrease the molecular mass of the complexes. AS

Sal seeds

1386

Tharanathan (RN), Changala Reddy (G) and Muralikrishna (G). **Physico-chemical characteristics of starches from sal (*Shorea robusta*) and dhupa (*Vateria indica*) seeds.** *Starch/Stärke* 42(7): 1990: 247-251

Pure, white starches were isolated in ~30% yields from defatted sal and dhupa meals. Both starches consisted of granules of varying size and shape characteristics, and contained considerable amounts of protein and lipid constituents. C 18:1, C 16:0 and C 18:0 were the major fatty acids present in both free and bound lipid fractions; whereas the latter in addition contained C 18:2 (~20%). Both starches exhibited two-stage swelling in water; for sal starch the solubility was marked by lower but its swelling power was considerably higher. In DMSO the sal starch was readily soluble but not dhupa starch (only ~20% solubility). The hot paste viscosity as well as set back viscosity of dhupa starch was much higher in comparison to those by sal starch. Very highly purified sal starch virtually exhibited no hot paste viscosity, and behaved like amylopectin-rich material. The latter had only 1.5% amylose as against of ~24% in original sal starch. X-Ray powder patterns revealed sal starch to be of A-type and dhupa starch to be of B-type. Both the starch granules were susceptible for *in vitro* attack by human salivary α -amylase. AS

Soybeans

1387

Horvath (E) and Crukor (B). **Functional properties and protein extractability of dielectric heated soybeans.** *Die Nahrung* 34(4): 1990: 337-343

Soybeans with innate moisture (10%) and with moisture of 20% were treated in a dielectric heater up to final temp. of 107 C and 127 C respectively. Functional properties and protein extractability of soybeans were determined. Water absorption capacity increased, fat absorption capacity, emulsifying properties and Nitrogen Solubility Index of soy decreased after dielectric heating. The extractability of proteins by the methods of Osborne as well as Than and Shibasaki also decreased. The buffer containing sodium dodecyl sulphate and 2-mercapto-ethanol, could disrupt a part of bondings resulted during dielectric heat treatment. AS

Latunde-Dada (GO). **Some physical properties of ten soybean varieties and effects of processing on iron levels and availability.** *Food Chemistry* 42(1): 1991: 89-98

Ten Nigerian soybean var. analysed showed 6.01 - 9.50% seed coat, 6.95 - 15.34% leached solids, 99.3 - 197.7% swelling capacity, 1.82 - 2.36 g/cm³ seed density and comparable iron levels of the whole, dehulled and cooked soybeans. Roasting did not influence dialyzable iron. Dehulling decreased significantly diffusibility of iron. Dialyzable iron in defatted flour was 2.26%, in soy conc. 2.12%, in soy isolate 2.49% after 2 h pancreatic digestion and 3.91 - 13.6% in home-made products. Germination and fermentation enhanced iron. SD

1389

Rathmann (K), Morsel (J-Th) and Grunert (S). **Studies on activity determination of lipoxygenases from soybean.** *Die Nahrung* 34(1): 1990: 29-35 (De)

Lipoxygenases play an important role in the evaluation of oil and oilseed quality. In this paper selective detn. of their isoenzymes with easy analytical methods is reported. Literature methods are tested and optimized to evaluate their applicability. The separate detn. of L-1, L-2 and L-3 isoenzymes by a UV photometric method is described using as an example soya lipoxygenase. Linoleic acid (pure and in mixtures) was the substrate of all oxidation reactions. The relative error of the detn. of isoenzymes is about 2%. AS

1390

Sattar (A), Neelofar and Akhtar (MA). **Effect of radiation and soaking on phytate content of soybean.** *Acta Alimentaria* 19(4): 1990: 331-336

Phytate content of soybeans decreased significantly with increasing soaking time (3 - 12 h) and irradiation dose (0.25 - 1.00 kGy). The rate of phytate removal was generally greater during soaking at 50 C than at ambient temp. ($P < 0.01$). Loss of phytate was more on soaking in distilled water than in tap water. Irradiation doses independently decreased the original phytate (212.0 mg/100 g) to a range value of 182.5 - 102.5 mg/100 g, while soaking in tap and distilled water for 12 hr to 78.9 - 109.5 mg/100 g and 73.7 - 87.5 mg/100 g, respectively. Combination treatment resulted in greater destruction of phytate than either one. Max. destruction of phytate content (from 212.0 to 37.5 mg/100 g) occurred on soaking at 50 C of 1.0 kGy sample in distilled water. BV

Soy products

1391

Das (HK), Lambrev (A), Te (JE), Akterian (S) and Tantchev (S). **Response surface modelling of extrusion texturing of defatted soya grits.** *Journal of Food Science and Technology (India)* 29(3): 1992: 141-146

Effects of barrel temp. (die end), die temp., screw compression ratio, screw speed and feed moisture on expansion ratio, per cent water absorption, breaking strength, density and colour of extrudates including extruder mass flow rate during single-screw extrusion of defatted soya grits were studied using response surface methodology (RSM). Results were graphed as response surfaces showing areas of optimum extrusion processing parameters. A combination of high barrel and die temp. not favoured expansion. Low feed moisture level provided good expansion. It is evident that RSM is an useful technique in extrusion modelling. AS

Soy curd

1392

Changade (SP) and Tambat (RV). **Blending of soy milk with buffalo milk for preparation of soy curd.** *Journal of Food Science and Technology (India)* 29(3): 1992: 191-192

Soy milk (SM) was blended with buffalo milk (BM) with 6% fat in different combinations viz. 100% BM, 25% SM, + 75% BM, 50% SM + 50% BM + 25% BM and 100% SM. The av. values for sp. gr. ranged from 1.019 to 1.036, for viscosity from 1.3943 to 2.5337 cp and for fat from 1.02 to 6.00%. However, curd strength ranged from 6.40 to 39.40 g, total solids 7.91 to 16.38%, pH 4.24 to 5.00 and acceptability of product scored from 3.12 to 7.24 points out of 9 points. All the properties except pH showed decrease in the av. values with the increase in the proportion of SM in blends. The quality evaluation expressed that 25% SM + 75% BM curd was at par with the curd from 100% BM and superior over other blends. The curd evaluation score for 50% SM + 50% BM, 75% SM + 25% BM and 100% SM was statistically at par. AS

Soy milk

1393

Wang (SH) and Toledo (MCF). **Evaluation of the nutritional value of soy milks prepared from beans treated by microwaves.** *Archivos Latinoamericanos de Nutricion* 40(4): 1990: 572-587

Soy milk prepared from microwave treated soybeans showed lower protein, fat, ash and total solid

contents, as compared to a control milk prepared from soybeans not processed by microwaves. The soy milk obtained from soybeans with 8.7% initial moisture, treated by microwaves for 240 seconds, had the best total chemical score and the highest apparent methionine availability, as well as PER. The complete inactivation of the trypsin inhibitor activity was achieved with the milk prepared from soybeans with 56.8% initial moisture subjected to microwave treatment for 180 seconds. The soy milk obtained from soybeans with 38.8% initial moisture, processed by microwaves for 180 seconds resulted to have the highest, *in vitro*, protein digestibility. BV

1394

Paddy (PV) and Mital (BK). Physical and chemical characteristics of soy milk. *Journal of Food Science and Technology (India)* 29(3): 1992; 193-194

The physical and chemical characteristics of soy milk prepared from different varieties of soybean were determined. The colour of milk prepared from different varieties ranged from whitish to greyish white. The ranges of different characteristics for various soy milk samples were: total solids 5.16 - 5.96%, protein 2.38 - 2.95%, pH 6.3 - 6.7%, titratable acidity 0.13 - 0.17, sp. gr. 1.01 - 1.03, viscosity 4.5 - 5.0 cp, surface tension 102.10 - 111.79 dynes/cm and freezing point -0.7 - 0.8 C. AS

Soy proteins

1395

Hoshi (Y). Effect of moisture-sorption on gelation of commercial soy protein isolate. *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(5): 1991; 411-413 (Ja)

Effect of moisture-sorption on gelation of a commercially available soy protein isolate (SPI) was investigated. After the SPI was dispersed in water, the protein sample was lyophilized and stood for 1 day at 100% of rh and 50 C. Hardness and cohesiveness of a gel obtained from the SPI sample by heating at 90 C for 30 min in 0.01 M Tris-HCl buffer (pH 8.0) after moisture-absorption were increased by 12% and 32%, respectively, compared with those of the gel obtained only by heating (heated gel). When the buffer containing 0.5 M NaCl was used, the hardness was increased by about 6 times and the cohesiveness decreased to approx. 80% of those of the moisture-induced gel obtained in the absence of NaCl. However, it was observed that both texture parameters were higher by 22% (hardness) and 51% (cohesiveness), respectively, than those of the heated gel. AS

1396

Hwang (JK), Kim (YS) and Pyun (YR). Comparison of the effect of soy protein isolate concentration on emulsion stability in the absence or presence of monoglyceride. *Food Hydrocolloids* 5(3): 1991; 313-317

Emulsion stability (ES) was enhanced with increasing soy protein isolate (SPI) in the absence of monoglyceride. In the presence of 0.5% (w/v) of monoglyceride, ES was max. at 0.2% (w/v) of SPI concn. and at higher levels reduction was observed. The optimum hydrophile-lipophile balance concept to account for the stability of oil-in-water emulsions was suggested. SD

Sunflower

1397

Decherf-Hamey (S), Mimouni (B), Raymond (J) and Azanza (JL). Partial characterization of polypeptide components of sunflower (*Helianthus annus* L.) seed albumin fraction. *Die Nahrung* 34(4): 1990; 387-398

The albumin fraction of sunflower seed (*Helianthus annus*, cv. Mirasol) is a family of water soluble basic polypeptides which constitutes about 20% of the seed proteins. This fraction, isolated by selective isoelectric precipitation of globulins, has been studied in detail by sodium dodecyl sulphate gel electrophoresis, non equilibrium pH gradient electrophoresis and combination of these techniques using non reducing and reducing conditions. The molecular mass of the main polypeptides was markedly different between unreduced (12,000 to 16,500 g.mol⁻¹) and reduced from (100,000 to 18,000 g.mol⁻¹). As shown by NEPHGE mobility of these polypeptides was also altered by reduction. From these results and other observations it is concluded that the stability of the globular structure of some polypeptides is dependent on the presence of intact disulphide crosslink(s). By multidimensional gel electrophoresis it was shown that the polypeptide components of each molecular mass classes displayed a high heterogeneity in net charge. Thus ion exchange chromatography procedures allowed only partial separation of different polypeptidic groups. Their amino acid composition shows that some of these fractions are, on the basis of their lysine and sulphur containing amino acids, of nutritional interest. AS

TUBERS AND VEGETABLES

1398

Kochar (GK) and Sharma (KK). Fibre content and its composition in commonly consumed Indian

Mean percentage of dietary fibre as neutral detergent fibre (NDF) on dry matter basis was highest in green leafy vegetables (22%) followed by other vegetables. Fruits which are eaten with outer peel and seed were rich in cellulose (63 - 71%). Vegetables and fruits which are eaten without outer peel and seed had high contents of hemicellulose (51 - 79%). AS

Carrots

1399

Ahmed (EM), Mirza (S) and Arreola (AG). **Ultrastructural and textural changes in processed carrot tissue.** *Journal of Food Quality* 14(4): 1991: 321-330

Carrot slices (raw, thermally processed and frozen/thawed) were tested by transmission electron microscope and instron. In frozen/thawed sample, cell walls were intact and dense, middle lamella lost pectic materials and cells and were not so closely pressed as raw sample. The modulus of deformity and stiffness for frozen/thawed and thermally processed carrots was comparable while toughness for the latter significantly lower. The results indicated that different areas of carrot tissue behave differently to thermal processing. SD

Cassava

1400

Bradbury (JH), Egan (SV) and Lynch (MJ). **Analysis of cyanide in cassava using acid hydrolysis of cyanogenic glucosides.** *Journal of the Science of Food and Agriculture* 55(2): 1991: 277-290

Guided by the results of NMR experiments on the reactivity of linamarin in alkali and acid, an acid hydrolysis method was developed for cyanide analysis in cassava. Hydrolysis in 2.0 M H₂SO₄ at 100 C for 50 min of a cassava extract produced cyanohydrins which rapidly decomposed to cyanide ion in alkali. Excess pH 6 buffer was added, followed by chloramine-T and pyridine/barbituric acid (Konig reaction) to produce a purple solution which was measured spectrophotometrically at 583 nm. The colour intensity depended on pH and phosphate concn., hence accurate results required similar solution conditions for KCN standards. The method gave reasonable agreement with results obtained by the use of linamarase, and adequate recoveries of added linamarin (70 - 95 degree dependent on conditions). Acid hydrolysis is cheaper than the enzymic method using linamarase, which is expensive. Also the pyridine/barbituric acid

reagent used in the acid hydrolysis method is cheaper and more stable than the pyridine pyrazolone normally used in the enzymic method. Six locally grown cultivars gave < 30 mg HCN kg⁻¹ fresh tuber, and one cv (SM 1 - 150) contained only 4 mg HCN kg⁻¹ fresh weight. Analyses of the same cv grown more recently gave values of 13 - 27 mg HCN kg⁻¹, showing the need for a study of the environmental factors influencing the cyanide content of cassava tubers. AS

1401

Akingbala (JO), Oguntimein (GB) and Abass (AB). **Effect of processing methods on quality and acceptability of fufu from low cyanide cassava.** *Journal of the Science of Food and Agriculture* 57(1): 1991: 151-154

The effects of steeping whole and grated tubers and of periodic change of water during steeping on the quality and acceptability of fufu from low-cyanide cassava were evaluated. Steeping increased the acidity and reduced the pH and cyanide content of cassava. Grating the tuber before steeping improved aroma, and periodical change of water during steeping improved taste, colour and texture of fufu over that produced by the traditional method. Fufu from low-cyanide cassava had an acceptability similar to that of fufu from high-cyanide cassava. However, oven drying of the flour significantly reduced acceptability of fufu. AS

Turnips

1402

Perkins-Veazie (PM) and Collins (JK). **Colour changes in waxed turnips during storage.** *Journal of Food Quality* 14(4): 1991: 313-319

Turnip (*Brassica campestris* L. var. *rapifera*) roots were stored (unwaxed, waxed in vented plastic bags and cardboard boxes) for 6 wks. Turnips stored in plastic bags showed reduced wt. loss. The chroma of white portion increased regardless of package or wax. The external purple colour was unstable. SD

Potatoes

Potato starch

1403

Muhrbeck (P) and Eliasson (A-C). **Influence of the naturally occurring phosphate esters on the crystallinity of potato starch.** *Journal of the Science of Food and Agriculture* 55(1): 1991: 13-18

1404

Bayazeed (A) and Trauter (J). Investigation on changes in physical and technological properties of water soluble sizing agents during the ultrafiltration process. Part II. Ultrafiltration of carboxyl methyl (potato) starch. *Starch/Starke* 43(7): 1991: 262-272

Vegetables

1405

Padmavati (K), Udipl (SA) and Rao (M). Effect of different cooking methods of β -carotene content of vegetables. *Journal of Food Science and Technology (India)* 29(3): 1992: 137-140

β -carotene contents of 12 raw vegetables and 35 cooked preparations were estimated by column chromatography and spectrophotometry. The effect of different cooking methods was investigated by calculating the % loss in the cooked preparations. The extent of loss was lower when processing/heating was kept to a min. Cooking methods when used cumulatively such as grinding, chopping plus cooking for long periods or prolonged cooking resulted in progressive losses of β -carotene. Deep-frying resulted in twice the amount of loss that occurred during shallow-frying. AS

1406

Mann (SK), Harvinder Kaur and Tejinder Gulati. Effect of cooking on fibre content of vegetables. *Journal of Food Science and Technology (India)* 29(3): 1992: 185-186

The fibre (neutral detergent fibre (NDF), acid detergent fibre (ADF), hemicellulose, cellulose and lignin) fractions of raw and cooked vegetables were determined. The NDF, ADF and cellulose contents of raw and cooked vegetables were found to be significantly ($P < 0.05$) different. Further, in order to find out an alternate method to freeze-drying, two drying temp. (50 C and 100 C) were used to dry the samples. Lignin content significantly increased ($P < 0.05$) in the samples when dried at 100 C as compared to 50 C thus resulting in higher value of total fibre. BV

1407

Fujita (S), Tono (T) and Kawahara (H). Purification and properties of polyphenol oxidase in head lettuce (*Lactuca sativa*). *Journal of the Science of Food and Agriculture* 55(4): 1991: 643-651

Polyphenol oxidase (EC 1.10.3.1) in head lettuce (*Lactuca sativa* L.) was purified by ammonium sulphate fractionation, ion exchange chromatography and gel filtration. The enzyme was

found to be homogenous by polyacrylamide gel electrophoresis. The mol. wt. of the enzyme was estimated to be about 58 000 amu by Sephadex G-100 gel filtration. The purified enzyme quickly oxidised chlorogenic acid (5-caffeoyl quinic acid-) and (-)-epicatechin. The K_m values for the enzyme, using chlorogenic acid (pH 4.5, 30 C) and (-)-epicatechin (pH 7.0, 30 C) as substrate, were 0.67 mM and 0.91 mM, respectively. The optimal pH of chlorogenic acid oxidase and (-)-epicatechin oxidase activities were 4.5 and 7.8, respectively, and both activities were stable in the pH range 6 - 8 at 5 C for 20 h. Potassium cyanide and sodium diethyldithiocarbamate markedly inhibited both activities of the purified enzyme. The inhibitory effect of metallic ions such as Ca^{2+} , Mn^{2+} , Co^{2+} and Ni^{2+} for chlorogenic acid oxidase activity was stronger than that for (-)-epicatechin oxidase activity. AS

1408

Giami (SY). Effects of pretreatments on the texture and ascorbic acid content of frozen plantain pulp (*Musa paradisiaca*). *Journal of the Science of Food and Agriculture* 55(4): 1991: 661-666

The effects of water blanching, steam blanching, microwave blanching and calcium chloride pretreatment on the physical and sensory properties and ascorbic acid content of frozen plantain (*Musa paradisiaca* L) pulp was studied. After freezing and reheating, the microwave treatment produced a similar texture to that obtained with calcium chloride treatment, and both were significantly ($P < 0.01$) better than conventional water or steam blanching. Microwave treatment improved retention of ascorbic acid. AS

FRUITS

1409

Lu (JY), Stevens (C), Khan (VA), Kabwe (M) and Wilson (CL). The effect of ultraviolet irradiation on shelf-life and ripening of peaches and apples. *Journal of Food Quality* 14(4): 1991: 229-305

Peaches were (cv. Loring and Elberta) and Golden Delicious apples irradiated with UV (254 nm) to doses of 0.84×10^4 to 40×10^4 erg/mm² and stored for 10 and 20 days at 12 C and 30 days at 20 - 25 C respectively in dark room. In UV treated peaches fruits were firmer and showed lower pH and soluble solids and higher acidity while in UV treated apples lower pH, higher acidity and ascorbic acid was noticed. In general UV treatment reduced storage rot and delayed ripening. SD

1410

Rahman (SMM), Mosihuzzaman (M) and Westerlund (E). **Free sugars and dietary fibre in some fruits of Bangladesh.** *Food Chemistry* 42(1): 1991: 19-28

Ten varieties of seasonal fruits of Bangladesh (litchi, horbori, amloki, bangi, tarmuj, jamrul, kalajam, jalpai, karamcha and papaya) were analysed for polysaccharide constituents (water soluble non-starch as well as water-insoluble non-starch), dietary fibre and free sugars which are useful to evaluate the nutritional status of the fruits. SD

1411

Carbonell (E), Costell (E) and Duran (L). **Rheological behaviour of sheared jams. Relation with fruit content.** *Journal of Texture Studies* 22(1): 1991: 33-43

Eight jam samples, strawberry, peach, plum and apricot at 50% and 30% fruit content were sheared. The time dependence of flow was eliminated and Casson's yield stress values obtained at two ranges of shear rates. Flow rate was adequately described by the Herschel and Bulkley model and significant differences in some of rheological parameters were found between samples of 50% and 30% fruit content. The results indicate that the change in these parameters could be used as indices of fruit content in jams. SD

1412

Hobbs (MC), Easterbrook (KM) and Melton (LD). **Cell wall material composition of mealy fruit among ripening nectarines.** *Journal of the Science of Food and Agriculture* 57(1): 1991: 141-145

Nectarines (*Prunus persica* cv Fantasia) after storage at 2 C for 27 days were sampled before and after ripening at 20 C for 7 days. The fruit population at 7 days' ripening was divided into two categories. At one extreme there were normally ripe fruit and at the other extreme fruit were mealy. Cell wall material, isolated from the 3 samples, was separated into CDTA- and Na₂CO₃-soluble and Na₂CO₃-insoluble fractions. A loss of uronic acid from the cell wall material during ripening was observed, but there was no difference between normal and mealy fruit. The neutral sugar content of cell walls was determined by GLC and there was an indication that differences in the relative amount of xylose and galactose existed between normal and mealy fruit. Gel permeation chromatography showed that there were minimal differences in the degree of polymerisation of pectic polymers isolated from normal and mealy fruit. AS

1413

Lal Kaushal (BB) and Chauhan (GC). **Advances in grading, packaging and marketing of fruits.** *Beverage and Food World* 18(4): 1991: 11-12

Apples

1414

King (K). **Characteristics of pectinesterase isolated from Bramley apple waste.** *Journal of the Science of Food and Agriculture* 57(1): 1991: 43-48

Pectinesterase was isolated from Bramley apple waste (peel, cores and offcuts) and its characteristics were determined. Optimum pectinesterase activity was obtained between pH 7.0 and 9.5 and activity was still detectable at 5.0. The enzyme was stable over a wide pH range in the presence of substrate, with over 90% of the activity retained after 5 min at pH 2.5. Pectinesterase activity increased with temp. up to 60 C. Activation energy was calculated at 32 kJmol⁻¹K⁻¹ between 20 and 50 C. Optimum activity was obtained in sodium chloride concn. between 0.025 and 0.20 M with activity declining at higher salt concn. A K_m of 0.044% apple pectin and a V_{max} of 9.52 units g⁻¹ DM were obtained for one specific enzyme extract. AS

Avocados

1415

Pardo (MES), Moreno (AO) and Alvarez (LD). **The effect of ethylene diamine tetracetic acid on preserving the colour of an avocado puree.** *Journal of Food Processing Preservation* 15(4): 1991: 261-271

Avocado purees with different concn. of EDTA to preserve colour showed that in 6 months storage concn. from 300 - 350 p.p.m. EDTA preserved the green colour and diminished pheophytin. SD

Bananas

1416

Agravante (JU), Matsui (T) and Kitagawa (H). **Sugars and organic acids in ethanol- and ethylene-treated banana fruits.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(5): 1991: 441-444

Ripening of banana was accelerated by 2 - 3 days with application of 60% ethanol (10 ml/12 fruits). However, 1000 p.p.m. ethylene induced more rapid ripening changes: in peel colour, sugars and organic acid contents. Sucrose, glucose and fructose were identified by HPLC. All the three sugars increased with ripening and sucrose was predominant at all

stages of ripeness. The increase in sucrose preceded that of glucose and fructose and the ratio of glucose-fructose was almost constant during the course of ripening, i.e., from initial (green) until 9 or 14 days of storage. Malic and citric acids were present in almost equal amounts in green fruits (initial). Malic acid increased 2 to 3.6 times the initial level, becoming the predominant acid in ripe fruits. Citric acid increased only in overripe and senescent fruits. AS

Citrus

1417

Miyake (M), Inaba (N), Nakayama (K), Maeda (H) and Ifuku (Y). **Screening of microorganisms for degrading citrus processing wastes.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(5): 1991: 398-404 (Ja)

Microorganisms which degrade citrus processing wastes were screened. Screening was designed to obtain strains which degrade the waste effectively, so that the residue can be easily dehydrated and its vol. and wt. reduced. Two hundred and forty three strains were isolated on a medium consisting of citrus peel, colong tea and coffee extracted wastes. Two sp. each of yeast and mold were characterized. They were identified as *Hansenula* sp. (Y-2), *Candida* sp. (Y-11), *Byssoschlamys* sp. (M-9) and *Aspergillus* sp. (M-21). The optimum temp. for growth was 40, 35, 45 and 40 C resp. The optimum pH was approx. 6.0. These organisms grew better on glucose, fructose, maltose and sucrose than on other carbon sources tested. Yeast extract was the most effective nutrient for the growth of these organisms. AS

1418

Miyake (M), Inaba (N), Nakayama (K), Maeda (H) and Ifuku (Y). **Degradation and volume-reduction of citrus processing wastes by microorganisms.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(5): 1991: 405-410 (Ja)

Citrus peels supplemented with rice bran and several nutrients were degraded on a lab. scale by 4 sp. of isolated organisms, *Hansenula* sp. Y-2, *Candida* sp. Y-11, *Byssoschlamys* sp. M-9 and *Aspergillus* sp. M-21. The peel mixture was incubated at pH 6.0, 40 C for 5 days. *Byssoschlamys* sp. M-9 was the most effective organism for reducing the wt. and vol. of the peel, which reducing rate was 54.3% and 29.6%, respectively. During 5 days incubation, the cell masses of *Byssoschlamys* sp. M-9 and *Aspergillus* sp. M-21 increased during the first 4 days. However, the cell numbers of *Hansenula* sp. Y-2 and *Candida* sp. Y-11 increased during the first

2 days and remained relatively constant thereafter. Hesperidin, one of the useful citrus constituents, remained constant throughout the degradation process. Therefore it was suggested that hesperidin was extracted more effectively from the degraded product than from the untreated peels. AS

CONFECTIONERY, STARCH AND SUGAR

1419

Gans (DA). **Sucrose and delinquent behaviour: Coincidence or consequence ?.** *CRC Critical Reviews in Food Science and Nutrition* 30(1): 1991: 23-48

Review. 153 references. SRA

Confectionery

Chocolates

1420

Keller (SE), Nash (TC), Newberg (SS) and Shazer (WH). **The degradation of aspartame in chocolate milk related to processing conditions and subsequent microbial load.** *Journal of Dairy Science* 74(4): 1991: 1214-1217

The rate of aspartame degradation was measured in sterile chocolate milk and compared with the rate of aspartame degradation in inoculated chocolate milk. These degradation rates were then compared with rates determined in chocolate milk produced in a pilot plant. All samples were monitored on a weekly basis to follow the change in pH, percentage of titratable acidity, microbial population, and aspartame concn. The half-life of aspartame in sterile milk was found to be up to 60% longer than that of HTST-processed chocolate milk. The rate of aspartame degradation in chocolate milk was found to be related to initial microbial load and subsequent growth of contaminants. AS

Starch

1421

Soni (PL), Sharma (H), Srivastava (HC) and Gharla (MM). **Physicochemical properties of *Canna edulis* starch - comparison with maize starch.** *Starch/Stärke* 42(12): 1990: 460-464

Starch from the rhizomes of *Canna edulis* was isolated, purified and its physico-chemical properties are compared with maize starch. Scanning electron microscopy of the granules show that they are oval to elliptical in shape. It has low

contents of lipids, ash and proteins, and has significantly higher content of amylose. It displays low water-binding capacity and gelatinization temp. Swelling and solubility are higher when compared with maize starch. Brabender viscosity of *C. edulis* starch is more than three times higher than maize starch and has shown no thinning. It retrogrades more than maize starch. AS

1422

Gomez (MH), Waniska (RD) and Rooney (LW). **Effects of nixtamalization and grinding conditions on starch of masa.** *Starch/Stärke* 42(12): 1990: 475-482

Starches from corn and sorghum masas were solubilized in water and their mol. characteristics were studied with high-performance, size-exclusion chromatography (HPSEC). Rheological properties of masa (smoothness, plasticity and cohesiveness) that are developed during lime-cooking, steeping and grinding of cereals were correlated to the starch solubility. Corn and sorghum were processed at different cooking times and grinding conditions; and the starch in masa was extracted with water at 85 C and 120 C for HPSEC analysis. Starches from corn and sorghum masas were affected in a similar way by the nixtamalization process; however, sorghum starch was more soluble than corn starch in flour and masa. Alkaline-cooking, steeping and stone-grinding did not depolymerize the cereal starch. All masas contained < 10% soluble solids of which 30 to 50% was starch solubilized. Soluble solids increased with longer cooking time and finer grinding. About 50% of the insoluble starch, which remained in the particulate solids of masas was solubilized in water at 120 C. The remaining starch was indispersible because either the starch remained inside endosperm pieces or inside gelatinized and retrograded gels. Several granular and mol. forms of starch were present in masa as a result of partial gelatinization, i.e. uncooked, swollen, and annealed starch granules, and soluble and retrograded amylose. Retrogradation of starch polymers occurred during steeping of cooked corn and during cooling of masa after grinding. Masa, a unique dough system, resulted from a network of starch polymers, uncooked and partially gelatinized starch granules supporting the rest of the kernel components into continuous phase of water. AS

1423

Varadharaju (N), Balasubramanian (M) and Parvathy (K). **Studies on the mechanical roasting of sago.** *Journal of Food Science and Technology (India)* 29(3): 1992: 177-178

An electrically heated mechanical sago roaster with an output of 100 kg/h was developed. The roasting

of sago was carried out at 12 temp. levels from 110 to 220 C with roasting time of 2 to 5 min. Stability, clustering, moisture and swelling were determined. A roasting at 170 C for 3 min was found to be most satisfactory as it had less clustering and high stability. AS

Sugars

1424

Hartel (RW) and Shastry (AV). **Sugar crystallization in food products.** *CRC Critical Reviews in Food Science and Nutrition* 30(1): 1991: 49-112

A review of recent literature on crystallization of the commercial sugars (fructose, glucose, lactose and sucrose) is presented. Topics include: nucleation, growth and effects of impurities and additives. 190 references. SRA

Lactose

1425

Smart (J), Haylock (S) and Gordon (M). **Lactose - an underutilized food ingredient.** *Food Australia* 43(9): 1991: 386-388

BAKERY PRODUCTS

1426

Chakraborty (MM). **Speciality fat products for bakeries and edible products.** *Indian Food Industry* 10(5): 1991: 27-32

Aspects covered in this review article are the history of shortening products, technologies with advanced shortening formulations, classification of shortenings, speciality baking shortening, fluid shortening (process technology and its development in the US), the application of shortenings in cakes and yeast raised products, yellow cake mix and chocolate cake mix shortening, margarine and spreads and the formulation of margarine oil blends. 7 references. CSA

1427

Ajit Joshi. **Snack foods: Yet to satisfy Indian palates.** *Beverage and Food World* 18(4): 1991: 15-17.

Covers definition of 'snack', world snack food markets (extruded snacks), Indian scene (chips and extruded products), noodles and others. BV

Bread

1428

Brochetti (D), Penfield (MP) and Heim-Edelman (MF). **Yeast bread containing distillers' dried grain: Dough development and bread quality.** *Journal of Food Quality* 14(4): 1991: 331-344

Commercial distiller's dried grain (DDG) contains 51.1% total dietary fibre and 25.8% protein and is more acidic, absorbed more water and oil than bread and whole wheat flours. Its substitution from 5 to 20% showed decrease in mixogram peak height and development angles, increase in peak time and decrease in loaf volume as DDG level increased. The quality difference by a trained panel showed significant deviation from the ideal multigrain bread. SD

1429

Huang (SD) and Miskelly (DM). **Steamed bread - a popular food in China.** *Food Australia* 43(8): 1991: 346-347, 350, 351

Aspects covered include: the demand for quality of wheats, steamed bread, production of steamed bread (mixing of dough, fermentation, neutralisation, moulding, proofing, steaming, quantity requirements for steamed bread) and future research. SRA

1430

Wei Lin and Lineback (DR). **Changes in carbohydrate fractions in enzyme-supplemented bread and the potential relationship to staling.** *Starch/Starke* 42(10): 1990: 385-394

White breads were prepared with and without bacterial α -amylase. Breads containing α -amylase became firm (staled) more slowly than did those without the added enzyme. Larger quantities of carbohydrate were extracted from enzyme-supplemented breads. The additional carbohydrate was mainly branched-chain material with an average chain length (CL) of 19 - 24. Thus, the α -amylase acts on starch during baking to form predominantly branched-chain polymers of lower mol. wt. These polymers apparently have a decreased ability to retrograde, interfere with the ability of amylopectin to retrograde after the bread is baked, or interfere with other interactions involved in firming, thus reducing the extent of firming (staling). AS

1431

Barber (B), Ortola (C) and Spicher (G). **Storage of wrapped bread. Part 2. Influence of sour dough and heat treatment on the sensoric quality of**

wheat bread. *Getreide-Mehl und Brot* 44(8): 1990: 235-241 (De)

1432

Venkateswara Rao (G), Savithri (GD) and Indrani (D). **Studies on the use of garlic in bread.** *Journal of Food Science and Technology (India)* 29(3): 1992: 147-149

Dough properties of wheat flour with the addition of 2, 4, 6 and 8% garlic extract showed a gradual adverse effect on the strength of the dough. As the garlic extract increased from 0 to 8%, farinograph dough stability decreased from 5.0 to 3.0 min and mixing tolerance index increased from 80 to 160 BU while mixograph and extensograph area values decreased from 69.6 to 52.5 cm² and 192 to 53 cm² respectively. Bread with garlic flavour and without any deleterious effect on its quality could be made with 2% addition of garlic extract. AS

1433

Indrani (D), Savithri (GD) and Venkateswara Rao (G). **Effect of onion extract on the rheological and bread making characteristics of wheat flour.** *Journal of Food Science and Technology (India)* 29(3): 1992: 150-152

Effect of adding 5, 10, 20, 30 and 40% onion extract to wheat flour on rheological and bread making characteristics has been studied. In general, dough properties with respect to strength and gas retention capacity were adversely affected gradually as the onion extract content increased in the dough from 0 to 40% as was evident from decrease in dough stability from 5.5 to 3.5 min, valorimeter value from 40 to 36 and increase in the mixing tolerance index from 80 to 160 BU of farinograph and the decrease in area values of mixograph and extensograph from 70.6 to 60.5 cm² and 111 to 85 cm² respectively. Consequently, the specific loaf volume of bread decreased from 3.4 to 3.0 ml/g. Bread with onion taste can be prepared with 20% incorporation of onion extract as the specific loaf volume (3.3 ml/g), the medium fine crumb grain and soft crumb texture were comparable to those of control bread. AS

Cake

1434

Guinot (P) and Mathlouthi (M). **Water vapour sorption hysteresis and the shelf-life of industrial sponge-cake.** *Acta Alimentaria* 19(4): 1990: 337-346

Addition of soy proteins at a level of 1% to sponge cake contributed to hysteresis stabilization. No significant effect of modified atm. (50% CO₂ - 50%

N₂) packaging was observed on water vapour sorption hysteresis. BV

Pasta

1435

Busch-Stockfish (M), Wilhelmi (F) and Knaack (A-D). **Influence of exchange of saccharose against honey on baking technology and sensoric quality by production of the pastry in household standard make. Part 1. Short pastry.** *Getreide-Mehl und Brot* 44(8); 1990; 243-246 (De)

1436

Ronchetti (R). **Filled pasta pasteurization by means of a microwave continuous plant.** *Getreide-Mehl und Brot* 44(8); 1990; 249-252 (De)

1437

Siebel (W) and Zwingelberg (H). **Sensoric evaluation and colour measurement of milled products from durum wheat and durum wheat pasta.** *Getreide-Mehl und Brot* 44(11); 1990; 345-350 (De)

Puri

1438

Shurpalekar (SR) and Shukla (VK). **Characteristics of Puri dough and Puri based on wheat and composite flours.** *Journal of Food Science and Technology (India)* 29(3); 1992; 153-158

Brabender farinograph, General Food texturometer and WB shear press have been successfully adopted for the first time to study objectively the quality characteristics of *puri* dough and *puri* based on *atta* (whole wheat flour)/*malda* (refined wheat flour) with or without upto 33% of flours from maize (*Zea mays*), Bengalgram (*Cicer arletinum*) and jowar (*Sorghum vulgare*). Optimum processing conditions for the preparation of dough of desired consistency and *puri* arrived at were: (1) water requirement of the dough based on (i) *atta*: 67 plus or minus 2% (ii) *malda*: 52 - 54% and (iii) blends of *atta* and (a) maize or jowar flour: 63 plus or minus 1% and (b) Bengalgram flour (*Besan*) 60 plus or minus 1% (2) rolling of dough sheet to 2 mm thickness and 12.5 cm diam. yielding *puri* with full puffing (3) frying temp. and time: 180 plus or minus 2 °C and 25 - 30 second respectively. The texture and eating quality of *malda* based *puri* was inferior to that based on *atta*, but improved on incorporation of 5 - 10% bran: however its puffing was affected adversely. *puri* of good overall acceptability could be prepared from composite flours based on wheat *atta* blended with maize/jowar flours at 15% level or with Bengalgram flour at 20% level. AS

Rolls

1439

Shi (M), Brummer (J-M) and Seibel (W). **Optimisation of evaluation and quality of Chinese steamed rolls. Part 1. Standardisation of production and quality evaluation.** *Getreide-Mehl und Brot* 44(8); 1990; 233-235 (De)

MILK AND DAIRY PRODUCTS

1440

Holcomb (DN). **Structure and rheology of dairy products. A compilation of references with subject and author indexes.** *Food Microstructure* 10(1); 1991; 45-108

Bibliography. 882 references. SD

1441

Lehmann (D), Askari (Chr), Henn (D), Dettmar (F), Hener (U), Mosandl (A). **Simultaneous stereodifferentiation of γ - and δ -lactones.** *Deutsche Lebensmittel-Rundschau* 87(3); 1991; 75-77 (De)

The simultaneous stereodifferentiation of all aroma relevant 4(5)alkyl-substituted $\gamma(\delta)$ -lactones is described, using multidimensional GC and the column combination OV 1701/Octakis (3-O-butyryl-2,6-di-pentyl)- γ -cyclodextrin. The method is applicated to the lactone flavour compounds of different fruits and the advance to the analytical differentiation between "natural" and "nature-identical" aromas is demonstrated. AS

1442

Nag (KN), Radha Charan and Yusuf Ali. **Maintenance of hygienic and sanitary condition in meat production.** *Beverage and Food World* 18(4); 1991; 26, 28-29

Aspects covered include meat hygiene control, sanitation requirement, cleaning compound, sanitizers for meat plants, water supply, liquid waste disposed, rodent control, insect control, employees and equipment. BV

Milk

1443

Smithers (GW), Bradford (RS), Regester (GO) and Pearce (RJ). **New casein protein products for the food industry. Physical, chemical and enzymatic manipulation of milk.** *Food Australia* 43(6); 1991; 252-254

The manufacture of whole casein, as an alternative to acid and rennet casein is described, and a simple process for isolation of individual casein proteins, particularly β -casein is outlined. Unique nutritive and functional properties of the casein derived peptide, a proteolytic fragment of K-casein isolated from cheese whey, have facilitated development of foods for specialised therapeutic applications. SRA

1444

Singh (RK), Nielsen (SS), Chambers (JV), Martinez-Serna (M) and Villota (R). **Selected characteristics of extruded blends of milk protein raffinate or non-fat dry milk with corn flour.** *Journal of Food Processing Preservation* 15(4): 1991; 285-302

Milk protein raffinates (MPR) at different levels of lactose and non-fat dry milk powders co-extruded with corn-flour at 100, 125 and 150 C showed complete gelatinization of starch, affected water holding capacity, nitrogen solubility index and sorption characteristics of the extruded samples. Lower processing temp. decreased browning irrespective of the lactose levels in MPR. MPR at more than 5% level decreased the extrudate expansion ratio, increased at breaking strength of extrudate and finally reversing it but below 5% level improved the texture. SD

1445

Tamime (AY), Kalab (M), Davies (G) and Mahdi (HA). **Microstructure and firmness of labneh (high solids yoghurt) made from cow's, goat's and sheep's milks by a traditional method or by ultrafiltration.** *Food Microstructure* 10(1): 1991; 37-44

Labneh samples prepared by traditional method and ultrafiltration method and smoothened by lactic and homogenizer showed 20.5 - 22.5% total solids (including minerals and un-metabolized lactose), 6.7 - 8.2% protein and 7.8 - 8.9% fat. Since homogenization markedly decreased the firmness and increased the pore size, it is not recommended in industrial production. Structures by electron microscopy of goat's and sheep's labneh, being similar, was less uniform than cow's labneh. SD

1446

El-Kest (SE) and Marth (EH). **Injury and death of frozen *Listeria monocytogenes* as affected by glycerol and milk components.** *Journal of Dairy Science* 74(4): 1991; 1201-1208

A cell suspension of *Listeria monocytogenes* strains Scott A in phosphate buffer solution alone or with

added glycerol, milk fat, lactose, or casein was frozen and stored at -18 C. At suitable intervals, samples of cell suspensions were thawed at 35 C and plated on suitable media to distinguish between surviving injured and noninjured cells of *L. monocytogenes*. Glycerol (2 or 4%) protected *L. monocytogenes* from death and injury during frozen storage for up to 6 months; however, when 2% glycerol was present, 30 min of frozen storage had to elapse after completion of freezing before protection against death was evident. During short-term (2 wk or less) frozen storage, lactose, milk fat, and casein, each at 2%, provided better protection to *L. monocytogenes* than did 2% glycerol. During long-term frozen storage, milk components, each at 2%, protected *L. monocytogenes* against death and injury, but less than that provided by glycerol. Protection by lactose and milk fat against death during frozen storage was observed during 4 wk and against injury during 5 months and 4 wk of frozen storage, respectively. Protection by casein against death and injury occurred during frozen storage for up to 6 months. Salts that simulate milk ultrafiltrate provided almost no protection to *L. monocytogenes* during freezing and frozen storage. Increasing the concn. of milk fat from 2 to 4% resulted in almost no change in death of *L. monocytogenes*, but in a decrease in injury only during the first 24 h of frozen storage. A similar change in concn. of lactose resulted in an obvious decrease in death of *L. monocytogenes* during frozen storage for up to 6 months and in a decrease in injury only during the first 24 h of frozen storage. AS

1447

Pouliot (Y) and Boulet (M). **Seasonal variations in the heat stability of concentrated milk: Effect of added phosphates and pH adjustment.** *Journal of Dairy Science* 74(4): 1991; 1157-1162

Natural variations in heat stability of 31% total solids concentrated milk have been surveyed over a 1-yr period. Very small variations occurred, and no distinctive instability period was observed. The stabilizing effect of pH adjustment with NaH_2PO_4 , Na_2HPO_4 or NaOH.HCl before sterilization was studied. The phosphates produced better stabilization than the acid-base combination at any pH between 6.0 and 7.0. The effectiveness of Na_2HPO_4 showed seasonal variations: the effects were marked on summer milk and smaller in winter milks. Conversely, seasonal variations were observed in the buffer capacity of the concentrates. The results emphasize the possibility of a specific stabilization mechanism by phosphate salts on conc. milks. AS

1448

Kohlmann (KL), Nielsen (SS) and Ladisch (MR). **Effects of a low concentration of added plasmin**

The relationship between proteolysis and gelation was studied in UHT-processed milk following the aseptic addition of the enzyme plasmin at a concn. of 0.15 mg/L. Individual 250-ml containers of commercially processed (direct steam injection, 134.4 C for 14.2 sec) milk were used. The milk was injected with plasmin 1 wk after processing and stored at room temp. (-23 C). Over a 6 month period, the milk was examined for changes in appearance, pH, apparent viscosity, gel formation, enzymatic activity, and casein breakdown. Control milk samples did not gel during the test period. The milk containers that received the plasmin addition began to form a gel at 90 days of storage, and this gelation was accompanied by an increase in apparent viscosity. In the samples with added plasmin, enzyme activity was detected using the chromogenic substrate, H-D-valyl-L-leucyl-L-lysyl-4-nitroanilide (S-2251), and casein breakdown was apparent as examined by SDS-PAGE. It appeared that the added plasmin preferentially attacked β - and α -caseins over k-casein. The evidence supports a relationship between a low level of plasmin activity and the gelation of UHT milk. AS

1449

Manjunath (GM) and Bhat (GS). **Effect of processing on native proteinases in milk.** *Journal of Food Science and Technology (India)* 29(3): 1992; 195-196

The activity of native proteinases in aseptically drawn milk was studied in relation to the processing treatments of milk. The increase in non-protein nitrogen (NPN) content of milk during incubation at 37 C was chosen as a measure of proteinase activity. The breakdown of proteins leading to increase in NPN was estimated by micro-Kjeldhal technique. The milk proteinases appeared to be partly resistant to certain processing treatments like chilling, homogenization and pasteurization. These enzymes can, therefore, cause proteolysis in processed milks. Heat processing above 80 C completely inactivated this enzyme. AS

1450

Sandhu (C) and Singh (RK). **Energy increase in operation and cleaning due to heat-exchanger fouling in milk pasteurization.** *Food Technology* 45(12): 1991; 84-91

This article deals with the mathematical model which estimates the increased energy costs associated with fouling of heat-exchangers and shows that they are of minor concern. CSA

Milk products

Butter

1451

Schroder (BG) and Baer (RJ). **Consumer evaluation of reduced-cholesterol butter.** *Food Technology* 45(10): 1991; 104-107

This article reports a home-use market study undertaken to determine whether acceptable, reduced-cholesterol butter could be produced by replacing milk fat with reduced-cholesterol milk fat. CSA

Cheese

Camemberts cheese

1452

Palich (P), Derengiewicz (W) and Switka (J). **Studies on the shelf-life of modified Camembert cheese.** *Acta Alimentaria* 19(4): 1990; 321-329

The modified Camembert cheese can be stored for 28 days at 4 C and for 6 days at 18 C. BV

Gouda cheese

1453

Rajesh (P), Kanawjia (SK) and Singh (S). **Acceleration of flavour and biochemical changes in buffalo milk Gouda cheese by flavourage.** *Beverage and Food World* 18(4): 1991; 31-33

Addition of flavourage to milk prior to renneting provides full characteristic cheese flavour in a short time. Flavourage 0.0005% level resulted in the most acceptable product. The flavour and body texture development in 1 month old experiment cheese was equal to 3 months old control. BV

Ras cheese

1454

Aly (ME). **Utilization of freeze-shocked lactobacilli for enhancing flavour development of Ras cheese.** *Die Nahrung* 34(4): 1990; 329-335

Freeze-shocked cultures of *Lactobacillus helveticus* or *L. casei* were added at levels of 1% and 2% to Ras cheese milk prior to renneting as an adjunct starter to enhance flavour development of cheese. These additives did not affect the gross chemical composition of the cheeses but increased the formation of soluble nitrogenous compounds. free

volatile fatty acids, the flavour intensity and improved the body characteristic. Also, the counts of bacterial groups (total, proteolytic and lipolytic) of the cheese treated with freeze-shocked lactobacilli were higher than in the control. Moreover, the ripening period was reduced to be 2 months compared with 4 months required for the control cheese. Also, using freeze-shocked culture of *L. helveticus* was the most effective in this respect. AS

Ice cream

1455

Lee (FY) and White (CH). **Effect of ultrafiltration retentates and whey protein concentrates on ice cream quality during storage.** *Journal of Dairy Science* 74(4): 1991: 1170-1180

Ultrafiltration retentates (conc. to three times) and whey protein concentrates were used to replace different levels of SNF in vanilla ice cream at 25, 50 or 75% and 25, 50, 75 or 100%, respectively. All mixes were formulated to make an ice cream containing 12% fat, 9.7% SNF, 12% sucrose, 4% corn syrup solids, and 0.3% stabilizer-emulsifier. Ice cream mixes were evaluated for pH and viscosity after 24 h of aging. These mixes were processed through an HTST pilot plant system and a 4.73-L (5-qt) batch freezer at 80% overrun. The drawing temp. was measured at this time. The ice creams were evaluated for chemical composition, microbiological quality, and sensory properties at 1, 30 and 90 days of storage. Heat shock stability and melt-down properties were tested after 30 days of storage. The results showed that the pH was affected significantly ($P < 0.05$) by substitutions of whey protein conc. and UF retentate. The pH and viscosity increased as the percentage of UF retentate substitution increased, but these two parameters decreased as the percentage of substitution with whey protein concentrate increased. Substitution with the concentrate at 75 and 100% significantly ($P < 0.05$) decreased the viscosity compared with the UF retentate products. The protein and lactose values were affected by replacing different levels of UF retentate in ice cream mixes. Protein values of 3.88 to 4.53% in UF retentate products were higher than those of ice cream with whey protein conc. at 3.18 to 3.55% ($P < 0.05$). Sensory evaluation results showed that ice cream made with substitution of SNF with UF retentate had higher flavour and body and texture scores than that made with whey protein concentrate. Substitution with 25% UF retentate produced the highest mean flavour score of 8.31. AS

Yoghurts

1456

Bayoumi (S). **Nisin and yoghurt manufacture.** *Chemie Mikrobiologie Technologie der Lebensmittel* 13(3/4): 1991: 65-69

Addition of 25 - 50 RUml⁻¹ of nisin was found to be optimal to produce yoghurt after 5 1/2 hr of incubation with good organoleptic properties and a shelf-life of about 19 days at 10 C and/or 33 days at 6 C. BV

Milk protein

1457

Mistry (VV) and Hassan (HN). **Delactosed, high milk protein powder. 1. Manufacture and composition.** *Journal of Dairy Science* 74(4): 1991: 1163-1169

The objective of this research was to develop a new method for the production of delactosed, high milk protein powder without pH adjustment. Skim milk containing approximately 3.2% protein and 4.91% lactose was ultrafiltered at 38 C to approximately 15% protein and 3.8% lactose. The ultrafiltered milk was batch diafiltered three times at 32 C with water to approx. 18.9% protein and 0.08% lactose and then spray dried. Inlet and outlet air temp. during drying were 120 to 125 C and 75 to 80 C, respectively. The av. composition of the dried product was 5.3% moisture, 83.9% protein, 2.27% fat, 0.73% lactose and 7.05% ash. Sodium dodecyl sulphate-polyacrylamide gel electrophoresis analysis of the powders showed that protein composition was similar to that of skim milk. This powder may have potential in the manufacture of new products or in the improvement of existing products such as low fat yoghurts. AS

MEAT AND POULTRY

Meat

1458

Gordon (A) and Barbut (S). **The microstructure of raw meat batters prepared with monovalent and divalent chloride salts.** *Food Microstructure* 9(4): 1990: 279-295

Comminuting lean meat with chloride salts showed differences in gel strand thickness: KCl and 1.5% NaCl formed multi-component mixed gels but formed more uniform gels when fat was added. Monovalent salts resulted in good distribution of fat globules in coherent matrices. The divalent salts promoted protein aggregation in raw batters. The CaCl₂ batter showed some fat instability, fat channels being not well interconnected. MgCl₂

caused widespread fat channelling and matrix disruption. Some gel formation in meat batters prior to cooking depends on the relative amounts and type of protein in the aqueous phase. $MgCl_2$ may destabilize batters due to extensive pre-cooking protein aggregation while $CaCl_2$ due to increasing protein-protein interaction. SD

1459

Werhoff (P), Bretschneider (W), Guntert (M), Hopp (R), Kopsel (M), Surburg (H). **Identification and formation of novel sulphur compounds in a meat flavour model system.** *Chemie Mikrobiologie Technologie der Lebensmittel* 13(3/4): 1991: 111-124

The reaction products formed from the aqueous mixture of cysteine, xylose, thiamin and ascorbic acid at 120°C for 5 hr in a lab. autoclave were isolated by simultaneous distillation/solvent extraction according to Likens-Nickerson. The resultant total flavour concentrate was found to possess a characteristic meat-like aroma and was analyzed by capillary GC and combined GC/MS. Identifications were solely focussed on sulphur-containing components which were additionally detected by a selective flame photometric detector. More than thirty volatile sulphur-containing substances have been identified including seven novel heterocyclic flavour components. The unknown flavour constituents were isolated by preparative capillary GC in microgram amounts sufficient for subsequent structure elucidation work by IR and NMR spectroscopic techniques. Spectral data and odour descriptions are given and possible pathways for the formation of these novel sulphur compounds are postulated. AS

1460

Fukal (L). **Modern immunoassays in meat-product analysis.** *Die Nahrung* 35(5): 1991: 431-448

This paper reviews immunochemical methods in meat-product analysis: identification of the origin of raw materials and detn. of protein additives (detection of meat sp. and detn. of minor meat proteins, non-meat proteins in meat products-vegetable protein, milk proteins); immunoassays of microorganisms and bacterial toxins (*Salmonella*, *Staphylococcal enterotoxins*), immunoassays of some contaminants in meat (drug residue, sex hormone residue, pesticides and mycotoxins); diagnosing animal diseases and immunochemical analysis of meat products in practice. 133 references. BV

Pork

1461

Goetsch (SJ), Cunningham (FE) and Chambers (EIV). **Shelf-life of raw and cooked fiber-formulated pork nuggets.** *Journal of Sensory Studies* 5(4): 1990: 241-249

1462

Todd (SL), Cunningham (FE), Schwenke (JR) and Goetsch (SJ). **Sensory analysis of fiber formulated ground pork patties.** *Journal of Sensory Studies* 5(3): 1990: 145-157

1463

Asghar (A), Gray (JI), Booren (AM), Gomaa (EA), Abouzied (MM), Miller (ER), Buckley (DJ). **Effects of supranutritional dietary vitamin E levels on subcellular deposition of α -tocopherol in the muscle and on pork quality.** *Journal of the Science of Food and Agriculture* 57(1): 1991: 31-41

Rabbit

1464

Dzudie (T) and Okubanjo (A). **Effects of two skinning and curing methods on the quality of rabbit meat.** *Journal of Food Science and Technology (India)* 29(3): 1992: 162-166

Thirty two rabbit carcasses were assigned to 4 treatment groups to study the effect of skinning and curing methods on quality and yield of cured rabbit meat. No significant difference was observed in wt. loss between unskinned non-injected and skinned injected cuts after aging except in the leg cut. Loss in wt. was greatest during the first wk of aging and was least during salt equilization and, during the last wk of aging. Both skinning and curing methods significantly affected the proximate composition and chloride content of the aged meat but had no effect on the final pH. Brine injection significantly affected the salt content and tenderness of the rabbit meat. However, differences were not discernible in the other sensory indices. AS

Products

1465

McMindes (MK). **Applications of isolated soy protein in low-fat meat products.** *Food Technology* 45(12): 1991: 61-64

The health benefits of isolated soy protein ingredient, its acceptability by the consumers due to the removal of the carbohydrate and lipid fractions, the strategies for the incorporation of isolated soy protein in meat products, its use in the formulation of low-fat ground beef patties and its application in various new products are described in this article. CSA

Patties

1466

Pati (PK), Anjaneyulu (ASR) and Kondaiah (N). **Effect of buffalo fat premix on the quality of patties.** *Journal of Food Science and Technology (India)* 29(3): 1992: 167-169

There was no significant difference in emulsion stability, cooking yield, shear force value, cooking shrink diam. of patties made with or without fat premixes. Patties containing fat premix made in bowl chopper had significantly ($P < 0.01$) lower mouth coating and higher acceptability compared to those containing fat premix prepared using meat mincer. Patties containing fat premix having equal proportions of meat, fat and whole egg liquid (WEL) had significantly ($P < 0.01$) lower mouth coating and higher acceptability. There was no significant difference between fat premix with or without WEL in reducing mouth coating. AS

Poultry

1467

Gna Song Kee and Babji (AS). **Effect of processing on yield and composition of spent hen surimi (ayami).** *Food Australia* 43(11): 1991: 494-495

The processing of spent hen and deboned broiler meat for production of chicken surimi (ayami) involved grinding followed by three cycles of washing. Grinding removed 66.5% collagen from spent hen meat and 43.8% collagen from broiler meat. Washing resulted in some wt. loss, increase in moisture content and collagen content and decrease in protein, fat and ash contents. SRA

SEAFOODS

1468

Garrett (ESIII) and Hudak-Roos (M). **Developing and HACCP-based inspection system for the seafood industry.** *Food Technology* 45(12): 1991: 53-57

A new and improved inspection system based on the HACCP concept, which would provide reasonable consumer protection in the consumption of seafood products is discussed in this article. CSA

Lobsters

1469

Ramaswamy (HS), Simpson (BK), Ya (T) and Yaylayan (V). **Tray-drying of carotenoproteins recovered from lobster waste.** *Journal of Food Processing Preservation* 15(4): 1991: 273-284

Caroteno-protein slurry dried in air drier at 45, 55 and 65 C 5 and 15% rh showed that the proximate composition of caroteno-protein dried at 45 C, 5 or 15% rh were comparable to that by freeze drying. Higher temp. adversely affected the nutritional composition and/or quality. SD

Fish

1470

Smith (G) and Hole (M). **Browning of salted sun-dried fish.** *Journal of the Science of Food and Agriculture* 55(2): 1991: 291-301

The lipid of traditional salted, sun-dried fish is highly susceptible to oxidation during processing and storage at tropical ambient temp. (25 - 30 C), leading to browning and potential loss of nutritional and economic value of the product. Determinations of extractable fluorescence and soluble brown colour have been found to be relevant indicators of the high degree of lipid oxidation in such fish. Studies on model systems consisting of aerated fish oil and a range of components natural to fish confirmed that, at 25 C, the products of lipid oxidation reacted with phospholipids and amino acids to produce significant fluorescence. Similarly, proteins and amino acids interacted with lipid oxidation products to produce browning, although at 25 C, this only occurred in the presence of water. Temp. above 50 C are required for the development of browning of aerated fish oil alone. The level of free amino acids in salted, sun-dried fish was found to decrease during storage which correlates with amino acid involvement in fluorescence and colour production. The fluorescence/colour can be related mechanically to the development of lipid oxidation products and hence provides a realistic basis for their acting as indicators of extensive lipid oxidation. AS

1471

Akoh (CC) and Hearnberger (JO). **Effect of catfish and salmon diet on platelet phospholipid and blood clotting in healthy men.** *Journal of Nutritional Biochemistry* 2(6): 1991: 329-333

1472

Roberts (B), Morris (BA) and Clifford (MN). **Comparison of radioimmunoassay and spectrophotometric analysis for the quantitation of hypoxanthine in fish muscle.** *Food Chemistry* 42(1): 1991: 1-17

1473

Careche (M), Currall (J) and Mackie (IM). **A study of the effects of different factors on the heat induced gelation of cod (*Gadus morhua*, L.) actomyosin using response surface methodology.** *Food Chemistry* 42(1): 1991: 39-55

The analysis indicated the effects of each of pH, concn. of protein, ionic strength, time and temp. of heating on gel strength (GS) and log gel strength (LGS) and interaction between pairs of factors e.g. lowering pH, increasing concn. of protein increased LGS on which the time of heating had no effect but only on temp. Interaction between concn. and pH; between pH and ionic strength were clear. SD

1474

Van Lith (HA), Zhang (X), Haller (M) and Beynen (AC). **Plasma butyrylcholinesterase activity in rats fed diets containing fish proteins.** *Die Nahrung* 35(5): 1991: 545-546

Catfish

1475

Huang (YW), Eitenmiller (RR), Lillard (DA) and Koehler (PE). **Storage quality of iced channel catfish fed different protein levels.** *Journal of Food Quality* 14(4): 1991: 345-354

The diets contained 24, 28, 32, 36 and 40% of protein levels. Fish fillets overwrapped with polyvinylidene chloride film and stored in ice for 21 days. Lowest protein level showed significantly high fat and no significant effect of fat content on free fatty acid and TBA number in all levels. Panelists could not find quality and off flavour difference between samples. SD

Rainbow trout

1476

Ando (M), Toyohara (H), Shimizu (Y) and Sakaguchi (M). **Post-mortem tenderisation of rainbow trout (*Oncorhynchus mykiss*) muscle caused by gradual disintegration of the extracellular matrix structure.** *Journal of the Science of Food and Agriculture* 55(4): 1991: 589-597

The gradual disintegration of the extracellular matrix structure which may be due to chilled storage was clearly demonstrated by light microscopic observations after compression. It is observed that the extracellular matrix structure might play an important role in maintaining the toughness of fish muscle. BV

Sardines

1477

Beltran (A) and Moral (A). **Changes in fatty acid composition of fresh and frozen sardine (*Sardina pilchardus* W.) during smoking.** *Food Chemistry* 42(1): 1991: 99-109

Free fatty acids separated in fresh and frozen sardine during mixed smoking by TLC, analysed by GC for fatty acids showed that oxidation during smoking resulted in loss of long chain n-3 C₂₀ and C₂₂ fatty acids and the former increased in frozen sardine due to extraction-related effects (weakening of protein-lipid linkage). SD

PROTEIN FOODS

1478

Ashturkar (PB), Vijaya Pande and Snehalatha Reddy. **Development and evaluation of weaning food formulations.** *Journal of Food Science and Technology (India)* 29(3): 1992: 197-198

Four weaning foods (RGB - Rajkeera:green gram:Bengal gram dhal, BRB - bajra:rice flakes:Bengal gram dhal, JSB - Jowar:Soy bean:Bengal gram dhal, JPG - Jowar:puffed Bengal gram:green gram mixes) were formulated and evaluated for sensory parameters. The weaning foods supplied 349 to 362 kcal and 12.6 to 17.2 g of protein per 100 g. Among the four weaning foods RGB had the highest Ca and Fe contents and the max. per cent digestibilities of proteins and carbohydrates. AS

Infant foods

1479

Fligner (KL), Fligner (MA) and Mangino (ME). **Accelerated tests for predicting long-term creaming stability of infant formula emulsion systems.** *Food Hydrocolloids* 5(3): 1991: 269-280

Sterilised, conc. infant formulae models from whey protein concentrate and high-heat non-fat dry milk to yield 40:60% casein to whey ratio. The protein, carrageenan and lecithin levels were varied. Emulsion stability was assessed by gravitational and centrifugal creaming, relative viscosity, adsorbed protein and light scattering. Evaluating the relationship of compositional factors to physical stability. It was found that centrifugation and relative viscosity were the best predictors of 10 and 18 wk stability. SD

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

1480

El-Salam (MHA), Mahran (GA), Haggag (HF), Mahfouz (MB) and Zaglol (A). **Manufacture and properties of beverages based on fermented permeate and natural fruit juices.** *Chemie Mikrobiologie Technologie der Lebensmittel* 13(3/4): 1991: 95-101

Reconstituted skim milk (10% total solids) was ultrafiltered. The obtained permeate was inoculated with a mixed culture of *Lactobacillus delbrueckii* ssp. *bulgaricus* and *Streptococcus thermophilus* (1:1) and incubated at 42 C for 24 hr. The fermented permeate was mixed with one of the following flavouring substances: orange juice, strawberry or apricot homogenates at the rate of 4:1. Suitable food grade colour, sugar and stabilizer were added and the prepared beverages were homogenized at 150 kg cm⁻². The prepared beverages had acceptable properties and good keeping quality for 15 days at room temp. and in the refrigerator. AS

Non-alcoholic beverages

Brandy

1481

Schwarz (E) and Hammes (WP). **The application of inulase producing yeasts for production of brandy from Jerusalem artichokes.** *Chemie Mikrobiologie Technologie der Lebensmittel* 13(3/4): 1991: 70-75 (De)

The fermentation of Jerusalem artichoke mashes for producing brandies was investigated at lab. scale as well as under practical conditions. The inoculation with inulase producing yeasts of *Kluyveromyces* sp., the pH of the mashes was reduced from 4.7 - < 3.5 which lead to reduced bacterial growth connected with a 24% increase in alcohol yield. BV

Coffee

1482

Trugo (LC), De Maria (CAB) and Werneck (CC). **Simultaneous determination of total chlorogenic acid and caffeine in coffee by high performance gel filtration chromatography.** *Food Chemistry* 42(1): 1991: 81-87

High performance gel chromatography method with TSK 3000-SW column developed showed good linearities and recoveries for chlorogenic acid and

caffeine determined simultaneously. They showed highly significant positive correlation 0.997 for caffeine also estimated by reverse phase chromatography and 0.998 for chlorogenic acid also estimated by AOAC and adapted reversed phase chromatographic methods with 8.5% and 5.0% coeff. of variations respectively. Green, roasted decaffeinated and instant coffees can be routinely analysed by this method. SD

1483

Maier (HG). **About the contents of carcinogenic substances in coffee.** *Deutsche Lebensmittel-Rundschau* 87(3): 1991: 69-75 (De)

A review is given of the publications of the last 25 yrs about the detn. of polycyclic aromatic hydrocarbons (PAH), nitrosamines and carcinogenic mycotoxins (including ochratoxin) in coffee. It follows that nitrosamines don't occur, mycotoxins seldom in green coffee, probably not in roasted coffee. In most cases, benzo[a]pyrene (BP) has been determined as a leading substance for all PAH. The other PAH occur normally in certain proportions to BP. The little amounts of BP are no problem for the consumer, because they make up only 0.03 to 0.6% of the total amount consumed with food. After normal roast the contents are often reduced in respect to green coffee. Differences between roasting by direct firing and by indirect air heating could not be detected. If the heat transfers to the beans by contact with hot surfaces, more BP is formed than by transfer from hot gases. The transfer of BP to the coffee brew depends on the concn. of benzo[a]pyrene in the roasted coffee and on the water-to-coffee ratio. It amounts to approx. 5% in the mean. Corresponding to that, the contents in coffee extracts are very low. 32 references. AS

Fruit juices

1484

Chandler (BV). **Fruit juice review. 7.** *Food Australia* 43(4): 1991: 143-145

This review covers raw materials, juice processing-general, juice processing-citrus fruits, juice processing-other fruits, packaging and storage, chemical analysis and components, adulteration control, industry matters and legislation. SRA

Orange juices

1485

Arreola (AG), Balaban (MO), Wei (CI), Peplow (A) and Marshall (M). **Effect of supercritical carbon**

dioxide on microbial populations in single strength orange juice. *Journal of Food Quality* 14(4): 1991: 275-284

Orange juice treated at 35, 45 and 60 °C; 8.3, 20.7 and 33.1 MPa showed some reduction of total plate count at low temp. The combination of high pressure, depressurization shear and lower pH due to temporary formation of carbonic acid could have inhibited the normal flora of juice. Kinetic parameters, D values for microbial reduction at the same temp. were generally lower and Z values decreased at high pressures. SD

1486

Ulgen (N) and Ozilgen (M). **Kinetic compensation relations for ascorbic acid degradation and pectinesterase inactivation during orange juice pasteurizations.** *Journal of the Science of Food and Agriculture* 57(1): 1991: 93-100

The thermal degradation kinetics of ascorbic acid and the inactivation kinetics of pectinesterase were studied experimentally with pH-adjusted orange juice. No simple trends were observed in variation of the kinetic parameters with pH, but both kinetic functions agreed with kinetic compensation relations. An isokinetic temp. was observed for ascorbic acid degradation at pH 2.5, 3.0 and 3.5 implying that the same degradation mechanism was valid at these pH values. A large deviation at pH 4.0 from this isokinetic reaction rate implied that the degradation mechanism was different at this pH. There was no isokinetic temp. for pectinesterase inactivation reactions, indicating that pectinesterase was inactivated by different mechanisms at different pH values. The variation of the inactivation mechanism of pectinesterase with pH was attributed to its more complex molecular structure. AS

Tea

1487

Finger (A) and Engelhardt (UH). **Flavonol glycosides in tea - kaempferol and quercetin rhamnodiglucosides.** *Journal of the Science of Food and Agriculture* 55(2): 1991: 313-321

Quercetin and kaempferol rhamnodiglucosides are characteristic compounds of *Camellia sinensis*. Their structures were determined as quercetin- and kaempferol-3-O- [β -D- glucopyranosyl-(1-3)- α -L-rhamnopyranosyl-(1-6)- β -D-glucopyranosides]. Reversed phase HPLC methods for preparative isolation and analytical separation of both compounds were developed. The structural elucidation of the compounds by means of NMR spectroscopy, fast atom bombardment MS and

GC-MS of the sugar moieties is described. Black tea contains 0-0.95 g kg⁻¹ quercetin rhamnodiglucoside and 0.05-1.25 g kg⁻¹ kaempferol rhamnodiglucoside. AS

Wines

1488

Arvanitoyannis (I), Fronimos (P) and Psomliadou (E). **Influence of the concentration of the main organic acids of wine on the cations adsorption of bentonites in synthetic wine.** *Die Nahrung* 35(5): 1991: 475-483

The influence of concn. of the main organic acids (tartaric, malic, citric and succinic acids) on the cation content (Ca, Mg, Fe, Cu, Zn and Mn) during treatment with optimum mass of two bentonites (Ca and Ca-Na) in synthetic wine, is studied. Only in case of succinic acid, a lower Fe absorption was observed, probably due to its weaker acid character, compared to other acids. BV

FATS AND OILS

1489

Loose (S), Meusel (D), Muschter (A) and Ruthe (B). **Water binding of adsorptive immobilized lipases.** *Die Nahrung* 34(1): 1990: 37-46 (De)

It is supposed that not only the total water content of lipase preparations but more their state of water binding is of technological importance in enzymatic interesterification reactions in systems nearly free from water. The isotherms at 65 °C of two microbial lipases immobilized on various adsorbents as well as different adsorbents themselves are shown. The water binding capacity in the range of water content of technological interest decreases from the anion exchange resin Amberlyst A 21 via nonpolar adsorbent Amberlite XAD-2 to Kieselgur Celite 545. It is demonstrated that water binding by lipases is depending on temp. but is also affected by adsorptive immobilization. Adsorptive immobilized lipases show hysteresis, which is very important for preparing a definite water content of the enzyme preparations. AS

1490

Ott (K) and Meusel (D). **A method for the quantitative determination of ω -3-polyunsaturated fatty acids by reductive ozonolysis.** *Die Nahrung* 34(1): 1990: 93-94

1491

Glücksman (M). **Hydrocolloids and the search for the "oily grill"**. *Food Technology* 45(10): 1991; 94, 96-101, 103

This article deals with the production of high-quality low-fat and no-fat food products by the conjunction of hydrocolloids with other food components. Various fat-replacer ingredients having fat-mimetic properties are synthetic fat substitutes, emulsifiers, hydrocolloids, starch-derivatives, hemicelluloses, β -glucans, soluble bulking agents, microparticulates, composite materials and functional blends and the application of these in salad dressings, frozen desserts and bakery products are discussed. CSA

1492

Khatoon (S). **Biotechnological approach for the modification of oils and fats**. *Indian Food Industry* 10(5): 1991; 38-41

The biotechnological approach of fats and oils modification by genetic manipulation and its advantages: chemical and biochemical interesterification, its advantages and applications and the recent trends in interesterification are discussed in this article. CSA

Fats

1493

Morsel (J-Th). **Lipid peroxidation. Part I. Primary reactions**. *Die Nahrung* 34(1): 1990; 3-12 (De)

Edible fats and oils are an important component of human nutrition. There are many kinds of changes and destruction of lipids. One of the most important processes is the autoxidation of essential fatty acids. Primary products of oxidation are monohydroperoxides of fatty acids formed by three different pathways. Thermal activation of fatty acids will be followed by thermodynamically controlled distribution of the hydroperoxidisomers. With enzymatic or photochemical oxidation specific distribution of isomeric hydroperoxides is observed. These products can be also used for the determination of the type of oxidation which took place. The hydroperoxides formed in the process of oxidation cause a radical chain reaction with a powerful progress of oxidation. The products formed by chain termination are characterized by different stability. These products include the possibility of decomposition and consequent reactions. AS

1494

Morsel (JTh) and Meusel (D). **Lipid peroxidation. Part 2. Secondary reactions**. *Die Nahrung* 34(1): 1990; 13-27 (De)

Lipids and lipid containing foods are altered by autoxidative processes resulting in the formation of hydroperoxides which are considered as the actual primary autoxidation products. These hydroperoxides cause a var. of secondary reactions giving di- and trihydroperoxides, hydroperoxyepidioxides, endoperoxides and hydroperoxyepoxides, so called secondary autoxidation products at a primary level. Sometimes they are only minor substances. The formation of primary autoxidation products is accelerated by reaction conditions as increased temp., oxygen, metal ions and sensibilisators but is inhibited by natural and synthetical antioxidants. The decomposition of hydroperoxides and secondary autoxidation products at the primary level results in volatile substances decreasing the flavour quality of lipid containing foods. Simultaneously there are other cleavage and decomposition products remaining in the lipid causing a reduction of its oxidative stability. AS

1495

Lewerenz (H-J), Bleyl (DWR), Ozierenski (B), Plass (R) and Macholz (R). **Toxicological effects of a fatty acid mixture in rats**. *Die Nahrung* 35(5): 1991; 465-474

The effects of a fatty acids mixture containing nearly 50% odd numbered fatty acids (PC-Saure) were studied in a subchronic toxicity test in male and female rats. The animals received PC-Saure in their diet at levels of 0, 1.25, 2.5 and 5% for 13 wks. Food intake was increased at 5% PC-Saure level in males. Food efficiency was initially decreased in males and females of this group. Ingestion of PC-Saure resulted in increases of the urine volume and the urinary lactate dehydrogenase activity in both sexes. Male and female rats fed PC-Saure showed elevated serum activities of alkaline phosphatase and leucine aminopeptidase and decreases in serum cholesterol and triglycerides. Dietary PC-Saure elevated the serum creatinine content in males at the two highest levels. A transitory increase in the activity of the serum alanine aminotransferase was observed in females fed 5% PC-Saure. Increased liver and kidney wt. were found in both sexes. AS

1496

Sen (DP). **Omega-3 fatty acids in health and disease**. *Indian Food Industry* 10(5): 1991; 33-37, 32

The importance of omega-3 fatty acids (FA) in human physiology, the effective use of omega-3 and

omega-6 FA in coronary heart disease, the studies conducted as an experimental evidence on the beneficial effects of omega-3 FA, the human requirements of omega-3 FA, sources of omega-3 FA (linseed oil, continental and aquatic food chain, micro-algae, oil-sardine fish) and its occurrence in Indian situation are covered in this article. CSA

Oils

1497

Blenford (D). **Speciality oils.** *Food* (5): 1991: 8-9

The author examines the rising popularity for speciality oils (hazelnut, pecan, almond, sesame (roasted, unroasted, black), grapeseed, olive and walnut). Aspects covered include fatty acid constituents, flavour characteristics and saturation values and application of speciality oils and standard oils. BV

1498

Marquard (R). **Investigations on the influence of genotype and location on the tocopherol content of the oils from different oil-crops.** *FAT Science Technology* 92(11): 1990: 452-455 (De)

Eight plant sp. have been cultivated on climatically differentiated locations as well as in phytotron trials, in order to determine the influence of genotype and environmental conditions on the tocopherol content of the oil. The tocopherol content has been related with the oil content of the seeds and the part of the main polyenic fatty acid of the plant. Considering the genetic range of variation and the inheritance an increase of tocopherol content through breeding efforts seems likely. Especially oil plants which seeds can directly be consumed or which oil needs not to be refined, seem to be promising. Concerning the environmental influence, biosynthesis of tocopherol was promoted by increased temp. The negative correlation to the oil content of the seed could be due to the fact that oil plants of our climatic conditions yield higher oil contents with low temp. AS

1499

Achaya (KT). **Overcoming constraints in edible oil usage.** *Indian Food Industry* 19(5): 1991: 22-26

Coconut oils

1500

Boutin (D). **Small-scale coconut oil mills. Use of fresh kernels.** *Oleagineux* 45(7): 1990: 330-331

This article describes the processing method of coconut for small scale extraction of coconut oil. Aspects covered are description of the processing method (shelling the fresh kernel, grinding the kernel, cooking, oil extraction, filtering and extraction rate), precautions during oil preparation, and investment required to setup a small-scale mill. BV

Palm oils

1501

Sidek (BB). **Palm oil extraction by double pressing.** *Oleagineux* 45(12): 1990: 559-565 (Fr)

The process consists in pressing the fruits once at low pressure, separating nut fibres from the press cake and pressing the fibres alone a second time at high pressure, hence avoiding the risk of breaking the nuts. The process reduces oil losses in fibre, reflected in a 0.2 p. 100 increase in the oil extraction rate and an increase of around 1 p. 100 in the kernel extraction rate. In addition, screw and press-cage wear is reduced, as is oil contamination by lauric oil. Lastly, with a few adjustments, it is possible to obtain palm oil with a high IV and carotene content for vitamin A extraction. AS

1502

Driss (F). **Nutritional role of dietary fats special reference to palm oil.** *Oleagineux* 45(8/9): 1990: 384-385

General properties of lipids (saturated fatty acids, monounsaturated fatty acids and polysaturated fatty acids), palm oil and blood lipids, palm oil and eicosanoids, palm oil and cancer, dietary lipids and peroxidation are discussed briefly. BV

1503

Berger (KG). **Recent developments in palm oil.** *Oleagineux* 45(10): 1990: 437-447

Aspects covered are: use of palm oil in foods (ice cream, processed cheese, hamburgers, meat croquettes, chicken nuggets, chocolate milk, chocolate custard and vanilla custard), crystallization process of palm oil, quality changes in palm oil during transport, pilot plants for the preparation of diesel fuel from palm oil, and the recovery of vitamin E compounds from palm fatty acid distillate. BV

1504

Jayalekshmy (A) and Mathew (AG). **Effect of roasting on the lipids, sugars and amino acids of oil palm kernel.** *Oleagineux* 46(4): 1991: 163-168

Palm kernel oil finds only limited use as a vegetable oil in India, mostly due to its bland flavour. Roasting of palm kernels improves the flavour of palm kernel oil, more or less comparable with coconut oil. Flavour compounds of roasted palm kernel include pyrazines, furans etc. which are formed during Maillard reaction between sugars and amino acids. The chemical changes occurring in the non-volatile constituents like lipids, sugars and amino acids of palm kernel on heating are not hitherto investigated and are reported for the first time. It is seen that lipids are not very much affected during heating. On the other hand, the sugars (L- rhamnose, mannose) and fructose and free amino acids (valine, isoleucine and leucine) are found to be more affected. AS

Rapeseed oils

1505

Kroll (J), Kujawa (M) and Schnaak (W). Preparation of rapeseed proteins by extraction. Ultrafiltration and diafiltration. *FAT Science Technology* 93(2); 1991: 61-65

From industrial rapeseed meal (*Brassica napus*, Var. Sollux) different protein preparates are prepared by varying extractions (water extraction, extraction with 1% CuSO₄ solution, extraction with 5% sodium chloride solution) following ultrafiltration (UF), diafiltration (DF) and drying. The UF, UF/DF respectively is a comparatively simple process for concn. and purification of all solved proteins without losses (globulins and above all albumins). The UF/DF treatment of a 5% sodium chloride solution protein extract leads to a preparate containing more than 90% protein in which glucosinolates and splitting products and also phytate are not detectable. AS

1508

Malecka (M). The effect of squalene on the heat stability of rapeseed oil and model lipids. *Die Nahrung* 35(5); 1991: 541-542

Results indicate that addition of squalene in the amount of 0.4% improved the stability of rapeseed oil and model lipids during heating at 170 C. BV

SPICES AND CONDIMENTS

Spices

1507

Kawakishi (S). Antiplatelet factors in spices. *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(5); 1991: 445-453 (Ja)

Turmeric

1508

Pawar (VS), Dev (DK), Pawar (VD), Rodge (AB), Surve (VD), More (DR). Moisture adsorption isotherms of ground turmeric at different temperatures. *Journal of Food Science and Technology (India)* 29(3); 1992: 170-173

Moisture adsorption characteristics of turmeric powder were evaluated at 15, 25, 35 and 45 C. The adsorption isotherms were sigmoid and represented the Type II isotherms according to the BET classification scheme. An upward temp. shift from 15 to 45 C led to a shift of isotherm towards the right side indicating that any constant moisture content, a_w increased with increasing temp. Of the 6 mathematical equations, BET equation was unsatisfactory as it gave very high relative mean square root of error (RMS %) values. Oswin, Smith, Halsey, Henderson and Chung-Pfost equations described well the data at low temp. but became less satisfactory at higher temp. as evidenced by the RMS (% values). Free energy change of adsorption decreased exponentially at all temp. as the moisture content of the sample increased. Binding energy of sorption calculated at three mean temp. (20, 30, 40 C) also decreased with increasing moisture content. The calculated values of isosteric heats of adsorption ranged from about 11 kcal/mole to 19 kcal/mole. AS

SENSORY EVALUATION

1509

Chai (E), Oakenfull (DG), McBride (RL) and Lane (AG). Sensory perception and rheology of flavoured gels. *Food Australia* 43(3); 1991: 256-261

Orange flavoured gels prepared from alginate, K-carrageenan or agar showed decreased smoothness, flavour and sweetness with gel strength; firmness increased with gel strength. The perceived firmness of alginate gels was > that of K-carrageenan gels having the same rupture strength or shear modulus; but smoothness, sweetness and flavour were greater in the K-carrageenan gels. SRA

1510

Lawless (HT) and Glatter (S). Consistency of multidimensional scaling models derived from odour sorting. *Journal of Sensory Studies* 5(4); 1990: 217-230

Six groups of subjects with varying degree of experience and training in odour evaluation were found highly similar as indicated by interpoint distance correlations (medium $r = 0.74$) obtained in multidimensional perceptual model analysis and also confirmed by retest correlation of a group tested twice. The odour sorting task was unaffected by learning other cognitive/linguistic influences and showed fair degree of reliability and inter-group consistency in odour quality perception. SD

1511

Griffin (R) and Stauffer (L). **Product optimization in central location testing and subsequent validation and calibration in home-use testing.** *Journal of Sensory Studies* 5(4); 1990: 231-240

Six different products made from varying the proportion of the 3 ingredients of a dry powdered soft drink were evaluated by a consumer panel on a 15 point liking scale. The data modelled in a consumer liking surface was used to optimize the product in a central-local test (CLT). Four of the differentially accepted products, evaluated by a paired-preference home-use test (HUT) confirmed the results indicating that CLT can be adopted to guide the product development process. SD

1512

Galvez (FCF) and Resurrection (AVA). **Comparison of three descriptive analysis scaling methods for the sensory evaluation of noodles.** *Journal of Sensory Studies* 5(4); 1990: 251-263

Data collected on two samples of mungbean starch noodles by unstructured line scale (ULS), semi-structured line scale (SLS) and category scales (CS) indicated that ULS being most reliable and sensitive the panelists discriminated better the samples. Also increased anchoring of line scales did not increase the sensitivity or the reliability of the scale. SD

1513

Lundahl (DS) and McDaniel (MR). **Use of contrasts for the evaluation of panel inconsistency.** *Journal of Sensory Studies* 5(4); 1990: 265-277

A statistical criteria, treatment interaction variation is used to identify panelist outliers and data analysis modified to remove the outlier influence for treatment differences. SD

1514

Thieme (U) and O'Mahony (M). **Modifications to sensory difference test protocols: The warmed up paired comparison, the single standard duo-trio and the A-not A test modified for**

response bias. *Journal of Sensory Studies* 5(3); 1990: 159-176

Difference tests modified according to psychological theory, e.g. paired comparison with 'warm-up', A-not A by addition of sureness judgements and duo-trio by using the weaker stimulus as the standard, showed improved sensitivity. Warmed up paired comparison test, overcoming the lack of definition of the dimension of difference between treatments, was found more sensitive than the duo-trio test. SD

1515

Blank (DM) and Mattes (RD). **Exploration of the sensory characteristics of craved and aversive foods.** *Journal of Sensory Studies* 5(3); 1990: 193-202

The data provided by 70 panelists confirmed that sensory characteristics induce cravings and aversions for different foods: cravings, being intermittent were found for sweet tasting and pleasant smelling items while aversions, being chronic for bitter or bad tasting and unpleasant smelling items. Chemesthetic attributes like texture and thermal sensations create cravings whereas texture and irritating sensations aversions. SD

1516

Fishken (D). **Sensory quality and the consumer: View points and directions.** *Journal of Sensory Studies* 5(3); 1990: 203-209

Quality is subjected to change owing to constant competition and improvement. Therefore its definition also changes according to the marketing objective till the attainment of superior quality. The flavour profiles of raw materials (tomato ketchup) could be controlled and the blending of flavours, brix-acid ratio, colour and quality of pulp be engineered to obtain superior quality product. Addition of fruit seeds may even enhance the naturalness of the product. SD

1517

Vincent (JFV), Jeronimidis (G), Khan (AA) and Luyten (H). **The wedge fracture test. A new method for measurement of food texture.** *Journal of Texture Studies* 22(1); 1991: 45-57

The instrumental tests on Cox apple and cheese were performed on an Instron using wedges made from stiff-backed razor blades glued with epoxy to a wood spacer. A sensory panel of 13 members recorded the distance their teeth had penetrated into the samples of 15 mm apple cubes and 20 mm cheese cubes. Correlating these data, it was shown

that the wedge penetration technique can usefully be adopted to foods to determine fracture parameters of brittle, semibrittle foods, fruits and vegetables. SD

FOOD STORAGE

1518

Thorpe (GR), Tapia (AOJ) and Whitaker (S). **The diffusion of moisture in food grains - I. The development of a mass transport equation.** *Journal of Stored Products Research* 27(1): 1991: 1-9

In previous studies of diffusion of moisture content in stored grains the mass transfer driving force has been assumed to be either the gradient of the grain moisture content, or that of the water vapour pressure in the interstices of the grain. Effective diffusivities have been estimated empirically. In the present work a more fundamental approach is adopted in the analysis and the laws of continuum mechanics are taken to be axiomatic. This enables to write the differential equations that govern mass continuity in the grain and interstitial air, and conditions at the grain/air interfaces complete the formulation of the boundary value problem. The next step of the analysis involves expressing the mass continuity equations in terms of spatially averaged moisture concn. This is achieved by invoking the spatial averaging theorem. A particularly novel aspect of the development is the establishment of constraints that must be satisfied if local mass equilibrium between each phase is to be assumed when the sorption isotherms are non-linear and temp. dependent. Finally, the mass transfer equation expressed in terms of volume averaged quantities and local deviations, from these quantities, is derived. BV

1519

Thorpe (GR), Tapia (JAO) and Whitaker (S). **The diffusion of moisture in food grains - II. Estimation of the effective diffusivity.** *Journal of Stored Products Research* 27(1): 1991: 11-30

In this paper the boundary value problems that govern the spatial deviations is formulated and solved and subsequently the effective diffusivity of moisture in stored grains is estimated. Particular care is taken to establish the length scale constraints that must be satisfied for the boundary value problems to be a true reflection of reality. In keeping with this approach, the constraints that must be satisfied to treat a bulk of grain as if it a spatially periodic porous medium is established. A closed form expression for the effective diffusivity of moisture in a bulk of grain is obtained by exploiting the properties of the Chang unit cell. Results from

the analysis are compared with published experimental data and it is found that agreement between the two is excellent. BV

INFESTATION CONTROL AND PESTICIDES

1520

Banks (HJ). **Influence of water and temperature on release of phosphine from aluminium phosphide-containing formulations.** *Journal of Stored Products Research* 27(1): 1991: 41-56

The rate of release of phosphine from commercial aluminium phosphide formulations was studied under controlled conditions in nitrogen with and without wheat in the exposure chamber. The shape of the cumulative release curve with time was unaffected by gas flow rate over the formulation or by temp., humidity or manufacturer. It was well described by a power function relating quantity released to time, changing to an exponential phase after 70% of decomposition. Although an exponent of 1.15 in the initial phase described curves both in the presence of and without wheat satisfactorily, an exponent of 1.00 gave a better fit to data from formulations in wheat. Time to 50% decomposition was dependent on absolute water content of the gas passing over the formulation and independent of temp. The rate of release under fixed conditions in the absence of wheat was linearly correlated with that in wheat. The rate of release in humidified nitrogen without wheat varied exponentially with gas flow rate reaching a limiting value at high flows. Release in wheat was little affected by gas flow. In 12.2% moisture content wheat at 30 C the release rate was 0.6 - 0.8 times the max. value attained under the same humidity and temp. but without wheat. At low gas flows most of the moisture required for reaction was abstracted from the grain, not obtained from the humidified gas. Under conditions where water availability was not rate limiting the rate of release of the most reactive formulation was about twice that of the least. The test systems described provide a means of rapid comparative assessment of release characteristics of formulations. A method of reconstructing cumulative release curves is given. AS

1521

Longstaff (BC). **An experimental study of the fitness of susceptible and resistant strains of *Sitophilus oryzae* (L.) (Coleoptera: curculionidae) exposed to insecticide.** *Journal of Stored Products Research* 27(1): 1991: 75-82

Three resistant strains of *Sitophilus oryzae* were assessed at 30 C and 55% RH for their effect to sublethal doses of deltamethrin and

pirimiphos-methyl. All 3 resistant strains showed higher fecundity levels than the susceptible strain in the control treatments. The susceptible strain showed the most pronounced effects to exposure to insecticide, with a doubling of fecundity in the 1st wk of exposure to the lowest dose of pirimiphos-methyl, followed by progressive reductions to zero. No progeny were produced at the higher doses. Deltamethrin invariably reduced fecundity in this strain. Exposure to the highest dose of deltamethrin, resulted in a 10% reduction in the geometric mean developmental period in the susceptible strain, due to a skewing of the emergence curve. The other strains showed substantially smaller changes. The overall effect of these responses upon population growth rate is investigated and it is apparent that increasing the dose of an insecticide may not always reduce the population growth rate, even though mortality is increased. BV

1522

Bell (CH) and Savvidou (N). **Tolerance of the diapausing stages of *Plodia interpunctella* and *Ephestia cautella* (Lepidoptera: pyralidae) to methyl bromide and its correlation with diapause intensity.** *Journal of Stored Products Research* 27(2); 1991: 109-114

The duration of diapause at 20 C in 8 stocks of *Plodia interpunctella* and 2 stocks of *Ephestia cautella* was compared with the tolerance of diapausing larvae to methyl bromide, the fumigant used for the control of infestations of these moths in the food industry. The tolerance of the *P. interpunctella* stocks ranged from quite low to very high, the most tolerant individuals requiring a concn. time (ct) product of 280 mg h/l. for complete kill. Some changes were evident in the individual tolerances of 6 stocks of this sp. over a 6 yr period, probably as a result of a set lab. rearing procedure. The 2 stocks of *E. cautella* both showed a moderate degree of tolerance, all larvae dying at ct products of 150 mg h/l. or above at 15 C. Taking all results together, a significant direct correlation was established between either mean or max. duration of diapause in these moths, the higher was the tolerance shown to methyl bromide. An increase in the mean duration of diapause from < 50 to > 80 days was accompanied by an increase in the LD₉₉ from < 130 to > 210 mg h/l. AS

1523

Schmidt (GH), Risha (EM) and El-Nahal (AKM). **Reduction of progeny of some stored-product Coleoptera by vapours of *Acorus calamus* oil.** *Journal of Stored Products Research* 27(2); 1991: 121-127

The number of offspring emerging from the adult diets used during and after treatment with *Acorus calamus* oil vapours against the adults of *Sitophilus granarius* (L.), *S. oryzae* (L.) and *Callosobruchus chinensis* (L.) was considerably lower than in the respective controls. The results indicate that a 96 h exposure to *A. calamus* oil vapour was satisfactory for controlling the adults and their deposited eggs. On the other hand, in *Tribolium confusum* there was no effect. BV

1524

Kraus (S) and Gerrard (D). **Pest control with pressurized CO₂ - an alternative to common treatment with poisonous gases.** *Getreide-Mehl und Brot* 44(8); 1990: 246-248 (De)

BIOCHEMISTRY AND NUTRITION

1525

Kanwar (JR), Sharma (PB) and Kanwar (SS). **Biochemical and nutritional characteristics of non-conventional protein sources.** *Journal of the Science of Food and Agriculture* 55(1); 1991: 141-151

Some nutritional and antinutritional characteristics of *Cucumis sativus* L and *Lagenaria vulgaris* (Molina) Standl seeds were studied. The mature seed kernels contained 312-318 gkg⁻¹ crude protein, 9 - 10 gkg⁻¹ crude fibre, 444 - 463 gkg⁻¹ crude fat, 43 - 45 gkg⁻¹ ash and 114 - 142 gkg⁻¹ carbohydrates. The biological values of cucumber and bottle gourd proteins were 74.35 and 74.20 respectively. The essential amino acid profile compared well with the FAO/WHO scoring pattern except for a deficiency of lysine and isoleucine. Lysine was the first limiting amino acid in both the proteins. The leucine:isoleucine and leucine:lysine ratios did not show imbalance. Trypsin inhibitor, phytate, lectin and tannin levels were determined in the defatted decorticated cucurbit seed meals. Heat treatment reduced the trypsin inhibitor and lectin activities in all samples to negligible levels. Levels of phytate and tannins were found to be similar in all samples. AS

1526

Siti-Mizura (S), Tee (ES) and Ooi (HE). **Determination of boric acid in foods: Comparative study of three methods.** *Journal of the Science of Food and Agriculture* 55(2); 1991: 261-268

Three models for the detn. of boric acid in foods were studied in detail, namely the titrimetric method using mannitol, and two colorimetric procedures using carminic acid or curcumin. Agar-agar strips, pickled mango, noodles and prawns were analysed

and the repeatability, sensitivity and recovery of the methods compared. The titrimetric curcumin methods gave mean values for boric acid which were significantly ($P < 0.05$) higher than those of the carminic acid method. Results with the titrimetric method did not differ from those with the curcumin method; the latter method gave good recoveries (-100%) for all 4 foods at all levels of addition. Analyses carried out on NBS Standard Material showed that the curcumin method gave the most accurate results. This method was also found to show the least internal variation both in terms of mean boric acid content and recovery. Furthermore, the method possessed practical advantages over the other two techniques. Based on the results obtained from the comparative studies, the curcumin method was found to be the most reliable and hence would be the method of choice for boric acid detn. in foods. AS

1527

Tolstoguzov (VB). **Functional properties of food proteins and role of protein-polysaccharide interaction.** *Food Hydrocolloids* 4(6): 1991: 429-468

This review discusses the functional properties of food proteins in multicomponent systems and the following trends of research: (i) complexing of proteins and polysaccharides including oligomeric proteins; (ii) nature of biopolymer incompatibility in solution; (iii) effect of thermodynamic incompatibility and complexing of proteins and polysaccharides on the functional properties of food proteins, including solubility and behaviour of proteins at the water-oil interface during emulsion stabilisation and on protein gelation; (iv) incompatibility of proteins and polysaccharides in their water-plasticized melt mixtures and the effect of this phenomenon on the formation of structure and properties of proteins textured by thermoplastic extrusion. SD

1528

Kowawig (S) and Morsel (JTh). **Comparative studies on quantitative determination of tocopherols.** *Die Nahrung* 34(1): 1990: 89-91 (De)

1529

Sacks (FM). **The role of cereals, fats, and fibers in preventing coronary heart disease.** *Cereal Foods World* 36(9): 1991: 822-826

1530

Torre (M) and Rodriguez (AR). **Effects of dietary fiber and phytic acid on mineral availability.** *CRC Critical Reviews in Food Science and Nutrition* 30(1): 1991: 1-22

This review covers fiber as the determinant of mineral availability: natural fiber sources (cereals, legumes and fruits), isolated fiber fractions (acid detergent fiber and neutral detergent fiber), individual fiber components (cellulose and hemicellulose, pectin, lignin and gums); the effect of phytic acid on mineral availability (chemistry and occurrence of phytic acid, interactions of Fe, Cu, Ca, Zn, Mg with phytic acid) and future developments. 134 references. SRA

1531

Kaushalya Gupta, Barat (GK), Wagle (DS) and Dhindsa (KS). **Effect of conventional and non-conventional green leafy vegetables on haematological indices and blood constituents of rats.** *Journal of Food Science and Technology (India)* 29(3): 1992: 182-184

Haematological studies revealed significant reduction in haemoglobin red blood corpuscles (RBC) and white blood corpuscles (WBC) in rats fed with different dry vegetables as sole protein source (T_1). Significant reduction in RBC was also observed when diet was supplemented (5g fresh/day) with fresh colocasia, drumstick, fenugreek and pumpkin (T_3) leaves. Differences in haemoglobin, RBC and WBC between male and female rats were significant. Relative neutrophilia and lymphocytopenia were observed in drumstick fed group (T_1). On the other hand, there were relative neutropenia and lymphocytosis in rats fed with dry drumstick vegetable contributing 2% protein in the diet (T_2). A significant increase in plasma protein in amaranth fed group and decrease in blood glucose in amaranth, colocasia and drumstick (T_3) fed groups was observed. AS

1532

Nayak (RR), Samant (SK) and Singhal (RS). **Vitamins as additives in processed foods.** *Beverage and Food World* 18(4): 1991: 22-25

This article discusses the various facets of vitamins as additives in processed food. Vitamins as antioxidants and colourants is discussed briefly. Use in shortening, lard, margarines and other fat based products, eggs, dairy products and analogues, flour based products, confectionery products, gelatin desserts and puddings, popcorn, fish sticks and potato chips, prevention of thermal oxidation of fats and edible oils, wines, meat, dairy products, fruit processing, carbonated beverages, fish products and as flour or bread improver is also covered in this article. BV

TOXICOLOGY

Nil

FOOD LAWS AND REGULATIONS

1533

Lewerenz (H-J), Mieth (G), Bleyl (DWR), Plass (R) and Schliemann. **Toxicological evaluation of sucrose carboxylic acid esters in subchronic feeding studies in rats. Part I. Effect of sucrose fatty acid polyesters.** *Die Nahrung* 35(5): 1991; 513-524 (De)

1534

Scherer (CW). **Strategies for communicating risks to the public.** *Food Technology* 45(10): 1991; 110, 112-116

Discusses the assumptions and issues associated with the conventional risk communication paradigm, explores the principles and consequent strategies of interactive risks communication as an emerging and more viable paradigm and some of the implications of this new paradigm for communicating about food risks, safety and quality. CSA

AUTHOR INDEX

- Abass (AB)
1401
- Abd El-Thalout (I)
1340
- Abdul-Hamid (J)
1322
- Abouzied (MM)
1463
- Abraham (L)
1344
- Acevedo (GB)
1377
- Achaya (KT)
1499
- Agravante (JU)
1416
- Aguilar (C)
1380 1381
- Ahmed (EM)
1399
- Ajit Joshi
1427
- Akhtar (MA)
1390
- Akingbala (JO)
1401
- Akobundu (ENT)
1328
- Akoh (CC)
1471
- Akterian (S)
1391
- Ali (A)
1336
- Alvarez (LD)
1415
- Aly (ME)
1454
- Andersson (O)
1373
- Ando (M)
1476
- Anjaneyulu (ASR)
1466
- Anjum (FM)
1336
- Arakawa (S)
1324
- Arbogast (RT)
1358
- Arreola (AG)
1399 1486
- Arvanitoyannis (I)
1488
- Asghar (A)
1463
- Ashenafi (M)
1370
- Ashok (KS)
1345
- Ashturkar (PB)
1478
- Askari (Chr)
1441
- Azanza (JL)
1397
- Babji (AS)
1467
- Baer (RJ)
1451
- Balaban (MO)
1486
- Balasubramanian (M)
1423
- Banks (HJ)
1346 1520
- Barat (GK)
1531
- Barber (B)
1431
- Barbut (S)
1458
- Basundhara Devi (Th)
1329
- Battu (RS)
1347
- Bayazeed (A)
1404
- Bayoumi (S)
1456
- BeMiller (J)
1363
- Beh (SK)
1322
- Behnke (U)
1326
- Bell (CH)
1522
- Beltran (A)
1477
- Berger (KG)
1503
- Beynen (AC)
1474
- Bhakare (HA)
1320
- Bhat (GS)
1449
- Blank (DM)
1515
- Blenford (D)
1497
- Bleyl (DWR)
1495 1533
- Blom (H)
1327
- Bolling (H)
1333
- Booren (AM)
1463
- Boulet (M)
1447
- Boutin (D)
1500
- Bradbury (JH)
1400
- Bradford (RS)
1443
- Bressani (R)
1362
- Bretschneider (W)
1459
- Brochetti (D)
1428
- Brummer (J-M)
1354 1439
- Bryden (WL)
1348
- Buckley (DJ)
1463
- Busch-Stockfisch (M)
1435
- Busse (M)
1370
- Carbonell (E)
1411
- Careche (M)
1473
- Carnovale (E)
1369
- Chai (E)
1509
- Chakraborty (MM)
1426
- Chambers (EIV)
1461
- Chambers (JV)
1444

Chandler (BV)
 1485
 Changade (SP)
 1392
 Changala Reddy (G)
 1386
 Chaudhry (NM)
 1336
 Chauhan (BM)
 1349 1365
 Chauhan (GC)
 1413
 Chelkowski (J)
 1342 1343
 Chrzanowska (J)
 1327
 Cierniewska (A)
 1343
 Clifford (MN)
 1472
 Collins (JK)
 1402
 Costell (E)
 1411
 Coulter (LA)
 1360 1361
 Cukor (B)
 1387
 Cubero (JI)
 1376
 Cunningham (FE)
 1461 1462
 Currall (J)
 1473
 Danilenko (AN)
 1374
 Das (HK)
 1391
 Davies (G)
 1445
 De Haro (A)
 1376
 De Maria (CAB)
 1483
 Decherf-Hamey (S)
 1397
 Dendy (J)
 1357
 Derengiewicz (W)
 1452
 Dettmar (F)
 1441
 Dev (DK)
 1508
 Dhindsa (KS)

1531
 Doble (P)
 1357
 Donath (R)
 1375
 Donlan (AM)
 1322
 Dorfer (J)
 1341
 Driss (F)
 1502
 Duran (L)
 1411
 Dzudie (T)
 1464
 Easterbrook (KM)
 1412
 Edwards (JP)
 1344
 Egan (SV)
 1400
 Eichner (K)
 1331
 Eitenmiller (RR)
 1475
 El Baya (AW)
 1354 1355 1356
 El-Kest (SE)
 1446
 El-Nahal (AKM)
 1523
 El-Salam (MHA)
 1480
 Eliasson (A-C)
 1403
 Eluchie (GU)
 1328
 Emefu (EE)
 1368
 Engelhardt (UH)
 1481
 Finger (A)
 1481
 Fishken (D)
 1516
 Flemming (JE)
 1378
 Fligner (KL)
 1479
 Fligner (MA)
 1479
 Fretzdorff (B)
 1333
 Fronimos (P)
 1488

Fu (B)
 1318
 Fujita (S)
 1407
 Fukal (L)
 1460
 Galvez (FCF)
 1512
 Gans (DA)
 1419
 Garrett (ESIII)
 1468
 Gast (K)
 1385
 Gatehouse (AMR)
 1378
 Gatehouse (JA)
 1378
 Gerrard (D)
 1524
 Gharra (MM)
 1421
 Giami (SY)
 1408
 Giese (JH)
 1330
 Gill (RJ)
 1348
 Glatter (S)
 1510
 Glicksman (M)
 1491
 Gna Song Kee
 1467
 Goetsch (SJ)
 1461 1462
 Gomaa (EA)
 1463
 Gomez (MH)
 1422
 Gordon (A)
 1458
 Gordon (M)
 1425
 Gray (JI)
 1463
 Grestenkorn (P)
 1352
 Griffin (R)
 1511
 Grinberg (VJ)
 1374
 Grossmann (S)
 1384

Grunert (S)	1429	Karovicova (J)
1389	Huang (YW)	1323
Guinot (P)	1475	Kaushal (KS)
1434	Hudak-Roos (M)	1345
Guntert (M)	1468	Kaushalya Gupta
1459	Hwang (JK)	1531
Gurmukh Singh	1396	Kawahara (H)
1371	Ibuki (F)	1407
Haggag (HF)	1367	Kawakishi (S)
1480	Ifuku (Y)	1364 1507
Haller (M)	1417 1418	Keller (SE)
1474	Imai (K)	1420
Hammes (WP)	1364	Khan (AA)
1482	Imbarack (RU-D)	1517
Hartel (RW)	1377	Khan (VA)
1424	Inaba (N)	1409
Harvinder Kaur	1417 1418	Khatoon (S)
1406	Inda (A)	1492
Hassan (HN)	1380 1381	Kheterpaul (N)
1457	Indrani (D)	1365
Haylock (S)	1432 1433	Khotpal (RR)
1425	Ink (S)	1320
Hearnsberger (JO)	1337	Kim (YS)
1471	Ishihara (H)	1396
Hebeish (A)	1324	King (K)
1340	Isomura (S)	1414
Heim-Edelman (MF)	1324	Kitagawa (H)
1428	Iwami (K)	1416
Hener (U)	1367	Klemm (H)
1441	Iwata (K)	1333
Henn (D)	1325	Klepacka (M)
1441	Jagdish Kumar	1382
Hilder (VA)	1372	Knaack (A-D)
1378	Jayalekshmy (A)	1435
Hiromi (K)	1504	Kochar (GK)
1325	Jeronimidis (G)	1398
Hisamatsu (M)	1517	Koehler (PE)
1364	Jimenez (MD)	1475
Hobbs (MC)	1376	Kohler (B)
1412	Joia (BS)	1319
Hocking (AD)	1347	Kohlmann (KL)
1346	Kabwe (M)	1448
Holcomb (DN)	1409	Komiya (T)
1440	Kalab (M)	1364
Hole (M)	1445	Kondalah (N)
1470	Kalra (RL)	1466
Hopp (R)	1347	Kopsel (M)
1459	Kanawjia (SK)	1459
Horvath (E)	1453	Kotaru (M)
1387	Kanwar (JR)	1367
Hoshi (Y)	1525	Kovac (M)
1395	Kanwar (SS)	1353
Howe (DS)	1525	Kowswig (S)
1378	Karel (M)	1528
Huang (SD)	1315	

Kozłowska (H)	1369	Mbata (GN)
1383	Lundahl (DS)	1368
Kraus (S)	1513	McBride (RL)
1524	Lupton (JR)	1509
Krishdhasima (V)	1335	McDaniel (MR)
1321	Luyten (H)	1513
Kroll (J)	1517	McGuire (J)
1505	Lynch (MJ)	1321
Kujawa (M)	1400	McMindes (MK)
1375 1505	Macholz (R)	1465
Kulkarni (AS)	1495	Melton (LD)
1320	Mackie (IM)	1412
Labuza (TP)	1473	Meusel (D)
1318	Maeda (H)	1489 1490 1494
Ladiach (MR)	1417 1418	Mieth (G)
1448	Mahdi (HA)	1533
Lal Kaushal (BB)	1445	Miller (ER)
1413	Mahfouz (MB)	1463
Lambing (K)	1480	Mimouni (B)
1319	Mahran (GA)	1397
Lambrev (A)	1480	Mirza (S)
1391	Maier (HG)	1399
Lane (AG)	1484	Miskelly (DM)
1509	Malecka (M)	1429
Latunde-Dada (GO)	1506	Mistry (VV)
1388	Malleshi (NG)	1457
Lawless (HT)	1366	Mital (BK)
1510	Mangino (ME)	1394
Lee (FY)	1479	Miyake (M)
1455	Manju Gupta	1417 1418
Lehmann (D)	1349	Mollah (Y)
1441	Manjunath (GM)	1348
Leufstedt (G)	1449	Moody (GJ)
1379	Mann (SK)	1322
Lewerenz (H-J)	1406	Moral (A)
1495 1533	Marquard (R)	1477
Li (Li)	1498	More (DR)
1358	Marshall (M)	1508
Lillard (DA)	1486	Moreno (AO)
1475	Marth (EH)	1415
Lineback (DR)	1446	Morris (BA)
1430	Martinez-Serna (M)	1472
Lokhande (AR)	1444	Morsel (J-Th)
1320	Masui (H)	1389 1493 1494 1528
Lombardi-Boccia (G)	1364	Mosandl (A)
1369	Mathew (AG)	1441
Longstaff (BC)	1504	Mosihuzzaman (M)
1521	Mathews (R)	1410
Loose (S)	1337	Mothes (R)
1489	Mathlouthi (M)	1384 1385
Lorenz (K)	1434	Muhrbeck (P)
1360 1361	Matsui (T)	1403
Lu (JY)	1416	Muralikrishna (G)
1409	Mattes (RD)	1386
Lullo (GD)	1515	

Muschter (A)
 1489
 Naes (H)
 1327
 Nag (KN)
 1442
 Nagl (W)
 1319
 Nakayama (K)
 1417 1418
 Nash (TC)
 1420
 Nayak (RR)
 1532
 Neelam Khetarpaul
 1349
 Neelofar
 1390
 Neilsen (SS)
 1448
 Neurohr (R)
 1319
 Newberg (SS)
 1420
 Nielsen (SS)
 1444
 Nierle (W)
 1354 1355 1356
 Nishikawa (U)
 1325
 Nishio (O)
 1324
 Noomhorm (A)
 1338
 Nowak (H)
 1383
 O'Mahony (M)
 1514
 Oakenfull (DG)
 1509
 Oguntimein (GB)
 1401
 Ohnishi (M)
 1325
 Ojimelukwe (PC)
 1368
 Okubanjo (A)
 1464
 Ooi (HE)
 1526
 Ortola (C)
 1431
 Ott (K)
 1490
 Ozlerenski (B)

1495
 Ozilgen (M)
 1487
 Padmavati (K)
 1405
 Palich (P)
 1452
 Pardo (MES)
 1415
 Parvathy (K)
 1423
 Pati (PK)
 1466
 Pawar (VD)
 1508
 Pawar (VS)
 1508
 Pearce (RJ)
 1443
 Penfield (MP)
 1428
 Penny (C)
 1332
 Peplow (A)
 1486
 Perkins-Veazie (PM)
 1402
 Perkowski (J)
 1342
 Phelps (BW)
 1317
 Piskula (M)
 1383
 Plass (R)
 1495 1533
 Polonsky (J)
 1323
 Popp (FA)
 1319
 Pouliot (Y)
 1447
 Prael (L)
 1374
 Prakash (HS)
 1366
 Prugarova (A)
 1353
 Pruthi (JS)
 1314
 Psomiadou (E)
 1488
 Pyun (YR)
 1396
 Radha Charan
 1442

Ragheb (A)
 1340
 Rahman (SMM)
 1410
 Rajesh (P)
 1453
 Ramaswamy (HS)
 1469
 Ramirez (JF)
 1380 1381
 Rao (M)
 1405
 Rathmann (K)
 1389
 Raymond (J)
 1397
 Reddy (PV)
 1394
 Refai (R)
 1340
 Regester (GO)
 1443
 Resurrection (AVA)
 1512
 Risha (EM)
 1523
 Rizvi (SSH)
 1380 1381
 Roberts (B)
 1472
 Rodge (AB)
 1508
 Rodriguez (AR)
 1530
 Ronchetti (R)
 1436
 Rooney (LW)
 1422
 Roos (Y)
 1315
 Ruthe (B)
 1489
 Sacks (FM)
 1529
 Saeki (A)
 1339
 Saidi (JA)
 1357
 Sakaguchi (M)
 1476
 Samant (SK)
 1532
 Sandhu (C)
 1450

Satish Kumar (L)
 1366
 Sattar (A)
 1390
 Savithri (GD)
 1432 1433
 Savvidou (N)
 1522
 Scherer (CW)
 1534
 Schliemann
 1533
 Schmandke (H)
 1373
 Schmidt (G)
 1373
 Schmidt (GH)
 1523
 Schnaak (W)
 1505
 Schneider (Ch)
 1373
 Schonfeld (A)
 1326
 Schroder (BG)
 1451
 Schultz (M)
 1373
 Schwarz (E)
 1482
 Schwenke (JR)
 1462
 Schwenke (KD)
 1374 1384 1385
 Seibel (W)
 1334 1439
 Sen (DP)
 1496
 Shantibala Devi (GA)
 1329
 Sharma (H)
 1421
 Sharma (KK)
 1398
 Sharma (PB)
 1525
 Shastry (AV)
 1424
 Shazer (WH)
 1420
 Shetty (HS)
 1366
 Shi (M)
 1439
 Shimizu (Y)

1476
 Shinnick (FL)
 1337
 Short (JE)
 1344
 Shukla (VK)
 1438
 Shurpalekar (SR)
 1438
 Sidek (BB)
 1501
 Siebel (W)
 1437
 Simko (P)
 1323
 Simmi Dhawan
 1371
 Simpson (BK)
 1469
 Singh (PP)
 1347
 Singh (RK)
 1444 1450
 Singh (S)
 1453
 Singhal (RS)
 1532
 Siti-Mizura (S)
 1526
 Smart (J)
 1425
 Smith (G)
 1470
 Smith (J)
 1357
 Smithers (GW)
 1443
 Snehalatha Reddy
 1478
 Soni (PL)
 1421
 Soto (EY)
 1377
 Spencer (G)
 1316
 Spicher (G)
 1431
 Sreenath (HK)
 1363
 Srivastava (HC)
 1421
 Stauffer (L)
 1511
 Stevens (C)
 1409

Subrahmanyam (N)
 1372
 Surburg (H)
 1459
 Surve (VD)
 1508
 Switka (J)
 1452
 Tambat (RV)
 1392
 Tamime (AY)
 1445
 Tantchev (S)
 1391
 Taoukis (PS)
 1318
 Tapia (AOJ)
 1518
 Tapia (JAO)
 1519
 Te (JE)
 1391
 Tee (ES)
 1526
 Tejinder Gulati
 1406
 Tharanathan (RN)
 1386
 Thieme (U)
 1514
 Thomas (JDR)
 1322
 Thomas (R)
 1316
 Thorpe (GR)
 1518 1519
 Throne (JE)
 1359
 Todd (SL)
 1462
 Toledo (MCF)
 1393
 Tolstoguzov (VB)
 1374 1527
 Tomita (T)
 1325
 Tono (T)
 1407
 Torre (M)
 1530
 Toyohara (H)
 1476
 Trauter (J)
 1404

Trugo (LC)	1319	Ya (T)
1483	Wakulinski (W)	1469
Udipl (SA)	1342 1343	Yamada (T)
1405	Wang (SH)	1364
Uhl (JC)	1393	Yaylayan (V)
1331	Waniska (RD)	1469
Ulgen (N)	1422	Yeh (H-Y)
1487	Wei (CI)	1367
Umaid Singh	1486	Yubai (C)
1372	Wei Lin	1338
Uronu (B)	1430	Yung (K-Y)
1357	Weipert (D)	1335
Van Lith (HA)	1350	Yusuf Ali
1474	Werhoff (P)	1442
Varadharaju (N)	1459	Zadernowski (R)
1423	Werneck (CC)	1383
Venkateswara Rao (G)	1483	Zaglol (A)
1432 1433	Westerlund (E)	1480
Vijaya Pande	1410	Zaror (VG)
1478	Whitaker (S)	1377
Villota (R)	1518 1519	Zhang (X)
1444	White (CH)	1474
Vincent (JFV)	1455	Zirwer (D)
1517	Wilhelmi (F)	1385
Wagle (DS)	1435	Zwingelberg (H)
1531	Wilson (CL)	1351 1437
Wahler (J)	1409	

SUBJECT INDEX

- 3-acetyl-deoxynivalenol**
wheat kernel,
3-acetyl-deoxynivalenol in 1342
- Acceptability**
lupin flour, acceptability of 1377
- Acetic acid**
vinegar, acetic acid fermentation
& production of rice 1339
- Acorus calamus oil**
insect, Acorus calamus oil effect
on 1523
- Actomyosin**
cod actomyosin, heat induced
gelation of 1473
- Additive**
processed food, vitamin additive
in 1532
- Aflatoxin**
wheat, *Sitophilus oryzae* &
aflatoxin contamination in
stored 1345
- Aluminium phosphide**
formulation, water/temp. &
phosphine release from aluminium
phosphide-containing 1520
- Amino acid**
palm kernel oil, roasting & amino
acid of 1504
- Amylase**
Bacillus/Rhizopus amylase,
properties of 1325
cranberry bean, α -amylase
of 1367
- Amylose**
corn starch, α -amylase &
hydrolysis of waxy 1363
- Antioxidant**
methyl linoleate, antioxidant
natural stability of 1331
- Antiplatelet property**
spice, antiplatelet factors in
1507
- Apple**
ultraviolet radiation &
shelf-life/ripening of apple 1409
waste, pectinesterase from
Brambley apple 1414
- Apricot juice**
manufacture/properties of
fermented permeate/apricot juice
based beverage 1480
- Ascorbic acid**
orange juice, pasteurization &
ascorbic acid degradation in 1487
plantain pulp, pretreatment &
ascorbic acid content of frozen
1408
- Aspartame**
chocolate milk,
processing/microorganisms &
aspartame degradation in 1420
- Aspergillus flavus**
wheat, *Asp. flavus*
growth/survival in phosphine
fumigated 1346
- Aspergillus oryzae**
wheat, *Sitophilus oryzae* & *Asp.*
flavus infection/aflatoxin
contamination in stored 1345
- Aspergillus parasiticus**
wheat, *Asp. parasiticus*
growth/survival in phosphine
fumigated 1346
- Avocado**
puree, ethylene diamine
tetracetic acid & colour
preservation of avocado 1415
- Ayami**
see *Surimi*
- Bacillus**
properties of *Bacillus*
 α -amylase 1325
- Bacteria**
faba bean flour, bacteria &
vicin/convicin degradation in
1375
- Bakery product**
fat speciality for bakery product
1426
- Baking**
pastry, saccharose & baking
technology of 1435
- Baking quality**
wheat flour, emulsifying lipid &
baking quality of 1354
- Bambara groundnut**
flour/protein isolate, insect
infestation &
composition/properties of
Bambara groundnut 1368
- Banana**
sugars/organic acid in
ethanol/ethylene treated banana
fruits 1416
- Barley**
composition/properties of high
protein/high lysine barley 1336
- Bengal gram flour**
sev preparation from defatted
blended Bengal gram flour-soy
flour-rice flour 1371
- Bentonite**
wine, bentonites cation
adsorption in synthetic 1488
- Beverage**
manufacture/properties of
fermented permeate/fruit juice
based beverage 1480
- Bioavailability**
wheat, biotin bioavailability in
1348
- Biotechnology**
oils/fats, biotechnology &
modification of 1492
- Biotin**
wheat, biotin bioavailability in
1348
- Boric acid**
food, boric acid detn. in 1526
- Brandy**
inulase producing yeast & brandy
production from Jerusalem
artichoke 1482
- Bread**
carbohydrate & staling in
enzyme-supplemented bread 1430
distiller's dried grain & quality
of bread 1428
garlic use in bread 1432
sour dough/heat treatment &
sensory quality of wheat bread
1431
steamed bread from China 1429
- Breadmaking**
wheat flour, onion extract &
breadmaking characteristics of
1433
- Browning**
fish, browning of salted
sun-dried 1470
- Buffalo milk**
soy curd preparation, soy milk
blended with buffalo milk for
1392
- Butter**
consumer evaluation of
reduced-cholesterol butter 1451
- Cadmium**
wheat flour, Cd binding to gluten
in 1353
- Caffeine**
coffee, caffeine detn. HPLC in
1483
- Cake**
sponge-cake, water vapour
sorption hysteresis/shelf-life
of industrial 1434
- Callosobruchus chinensis**
Acorus calamus oil effect on *C.*
chinensis 1523
- Camellia sinensis**

- see Tea
- Camembert cheese**
shelf-life of modified Camembert cheese 1452
- Canna edulis starch**
physico-chemical properties of Canna edulis starch 1421
- Carbohydrate**
bread, carbohydrate & staling in enzyme-supplemented 1430
- Carbon dioxide**
orange juice, supercritical carbon dioxide & microbial quality of 1486
peat control, CO₂ pressurized for 1524
- Carboxyl methyl starch**
ultrafiltration of carboxyl methyl starch 1404
- Carboxymethylation**
starch, carboxymethylation & rheological properties of rice/corn 1340
- Carcinogenicity**
coffee, carcinogenic substances in 1484
- Carotene**
vegetable, cooking method & β -carotene content of 1405
- Carotenoprotein**
lobster waste, carotenoprotein tray-drying recovered from 1469
- Carrageenan**
ELISA detn. for k-carrageenan 1324
- Carrot**
tissue, ultrastructural/textural changes in processed 1399
- Casein**
food industry, casein product new for 1443
- Cassava**
cyanide analysis in cassava 1400
- Catfish**
platelet phospholipid/blood clotting in healthy men, catfish diet effect on 1471
storage quality of iced channel catfish 1475
- Cell wall**
nectarine, cell wall material composition of ripening 1412
- Cereal**
coronary heart disease & cereal fat/fiber 1529
- Cereal product**
DLG quality test of cereal based food 1334
- Cheese**
Gouda cheese, flavourage & flavour acceleration/biochemical changes in buffalo milk 1453
Ras cheese, freeze-shocked lactobacilli & flavour enhancement in 1454
- Chemical property**
soy milk, chemical properties of 1394
- Chickpea**
cvs, cooking quality/nutritional value of chickpea 1372
temph, Salmonella infantis/*Escherichia coli* growth in fermenting 1370
- Chips**
Indian 1427
- Chloride**
meat batter, chloride salt & microstructure of raw 1458
- Chlorogenic acid**
coffee, chlorogenic acid detn. HPLC in 1483
- Chocolate milk**
processing/microorganisms & aspartame degradation in chocolate milk 1420
- Cholesterol**
butter, consumer evaluation of reduced-cholesterol 1451
oat fiber, serum cholesterol reduction by 1337
- Citrus waste**
microorganisms & degradation/volume reduction of citrus processing waste 1418
microorganisms degradation of citrus processing waste 1417
- Cleaning**
membrane, cleaning of formed-in-place 1316
- Clitocybe multiceps**
see Mushroom
- Coconut**
industry, diversification in coconut 1379
- Coconut oil**
kernel fresh use in small-scale coconut oil mills 1500
- Cod**
actomyosin, heat induced gelation of *Gadus morhua* 1473
- Coffee**
carcinogenic substances in coffee 1484
chlorogenic acid/caffeine detn. HPLC in coffee 1483
- Colour**
avocado puree, ethylene diamine tetracetic acid & colour preservation of 1415
durum wheat/milled durum wheat product, colour measurement of 1351
turnip colour change in waxed stored 1402
wheat, colour measurement of durum 1352
- Composite flour**
puri based on wheat/composite flour 1438
- Consumer**
sensory quality & consumer 1516
- Convicin**
faba bean flour, bacteria & convicin degradation in 1375
- Cooking**
chickpea cvs, cooking quality of 1372
vegetable, cooking method & β -carotene content of 1405
vegetables, cooking & fiber content of 1406
- Corn**
extruded corn grit-quinoa blend 1360
extruded corn grit-quinoa blend, physical properties of 1361
moisture content of cracked/whole corn 1359
pheromones for trapping *Prostephanus truncatus* in stored corn 1357
protein quality of high-lysine corn 1362
Tribolium castaneum, corn grain breakage & population increase in 1358
- Corn flour**
characteristics of extruded non-fat dry milk with corn flour 1444
- Corn protein**
protein quality of high-lysine corn 1362
- Corn starch**
lipid peroxide & interaction of corn starch 1364
oxidation/carboxymethylation & rheological properties of corn starch 1340
pullanase/ α -amylase & hydrolysis of waxy corn starch 1363
- Coronary heart disease**
cereal fat/fiber & coronary heart disease 1529
- Cowpea**
flour/protein isolate, insect infestation & composition/properties of cowpea 1368

- Cranberry bean**
Phaseolus vulgaris,
 α -amylase of cranberry
bean 1367
- Crystallization**
sugar crystallization in food
product 1424
- Curing**
rabbit meat, curing & quality of
1464
- Cyclodextrin**
lipid peroxide & interaction of
cyclodextrin 1364
- DDT**
wheat, DDT residues in rural
stored 1347
- Dairy product**
structure & rheology of dairy
product 1440
- Degradation**
citrus processing waste,
microorganism & degradation of
1417 1418
- Dehydrogenase activity**
grain soundness, dehydrogenase
activity & detn. of 1333
- Deoxynivalenol**
wheat kernel, deoxynivalenol in
1342
- Dhupa seed starch**
physicochemical properties of
dhupa seed starch 1386
- Diafiltration**
rapeseed protein, diafiltration &
preparation of 1505
- Dietary fiber**
mineral availability & dietary
fiber 1530
sugars/dietary fibre in
Bangladesh fruits 1410
- Disease**
omega-3 fatty acid in disease 1496
- Dough**
characteristics of puri dough 1438
distiller's dried grain & dough
development 1428
wheat dough, rheological
properties assessment of 1350
- Dried food**
fish, browning of salted
sun-dried 1470
- Drying**
lobster waste, carotenoprotein
tray-drying recovered from 1469
- ELISA**
carrageenan, ELISA detn. for 1324
- Emulsifier**
lecithin 1332
- Emulsion**
soy protein isolate concn. &
stability of emulsion 1396
- Energy**
milk pasteurization, energy &
heat exchanger fouling in 1450
- Environment**
lupin, environment & composition
of 1376
- Ephestia cautella**
methyl bromide & diapausing stage
tolerance of Ephestia cautella
1522
- Escherichia coli**
temph, Escherichia coli growth in
fermenting 1370
- Ethyl alcohol**
banana fruits, sugars/organic
acid in ethanol/ethylene treated
1416
rapeseed product, ethyl alcohol
extraction & chemical
composition of 1383
vinegar, ethanol fermentation &
production of 1339
- Ethylene**
banana fruits, sugars/organic
acid in ethylene treated 1416
- Ethylene diamine tetracetic acid**
avocado puree, ethylene diamine
tetracetic acid & colour
preservation of 1415
- Eurotium chevalieri**
wheat, E. chevalieri
growth/survival in phosphine
fumigated 1346
- Extraction**
palm oil, pressing & extraction
of 1501
rapeseed protein, extraction &
preparation of 1505
- Extruded food**
Indian 1427
characteristics of extruded
blends of milk products 1444
- Extrusion**
soya grits, extrusion texturing
of defatted 1391
- Extrusion cooking**
legume, extrusion cooking & iron
dialysability from 1369
- Faba bean**
globulin, oil-water interface
tension/O/W emulsion in fababean
1373
- Faba bean flour**
bacteria & vicin/convicin
degradation in faba bean flour
1375
- Faba bean protein**
isolate, conformational change in
succinylated faba bean protein
1374
- Fat**
bakery products, fat speciality
for 1426
biotechnology & modification of
fat 1492
- Fats animal**
patties, buffalo fat premix &
quality of 1466
- Fatty acid**
barley, fatty acids of high
protein/high lysine 1336
health/disease, omega-3 fatty
acid in 1496
lupin, genetics/environment &
fatty acid of 1376
polyunsaturated fatty acid detn.
reductive ozonolysis 1490
sardine, smoking & fatty acid
composition of frozen 1477
toxicological effects of fatty
acid mixture 1495
wheat starch, fatty acid &
pasting temp./viscosity of 1356
- Fenoxycarb**
wheat, fenoxycarb long-term
protectant of stored 1344
- Fermentation**
pearl millet, fermentation &
phytate/polyphenolic
content/starch in-vitro
digestibility/protein of 1365
vinegar, fermentation &
production of rice 1339
- Fiber**
coronary heart disease & cereal
fiber 1529
fruits/vegetables, fibre content
in commonly consumed Indian
1398
pork patties, sensory analysis of
fiber formulated ground 1462
vegetables, cooking & fibre
content of 1406
- Firmness**
labneh, microstructure & firmness
of 1445
- Fish**
browning of salted sun-dried fish
1470
muscle, hypoxanthine
radiolimmunoassay/
spectrophotometric analysis in
fish 1472
- Flavour**
Gouda cheese, flavourage &
flavour acceleration in buffalo
milk 1453
Ras cheese, freeze-shocked
lactobacilli & flavour

- enhancement in 1454
- Food industry**
casein product new for food industry 1443
- Food safety**
sanitation & food safety 1330
- Fouling**
membrane, fouling of formed-in-place 1316
- Frozen food**
plantain pulp, pretreatment & texture/ascorbic acid content of frozen 1408
- Fruit**
fibre content/composition in commonly consumed Indian fruits 1398
grading/packaging/marketing of fruit 1413
jam, fruit content & rheological properties of sheared fruit 1411
sugars/dietary fibre in Bangladesh fruit 1410
- Fufu**
processing & quality/acceptability of low cyanide cassava based fufu 1401
- Fungi**
sorghum, seed mycoflora/harvesting conditions & quality of 1366
- Fusarium**
wheat kernel, Fusarium-damaged 1343
- Garlic**
bread, garlic use in 1432
- Gel**
flavoured gel, sensory perception/rheology of 1509
- Gelation**
cod actomyosin, heat induced gelation of 1473
soy protein isolate, moisture sorption & gelation of commercial 1395
- Genetics**
lupin, genetics & composition of 1376
- Gluten**
wheat flour, Pb/Cd binding to gluten in 1353
- Glycerol**
Listeria monocytogenes, glycerol & injury/death of frozen 1446
- Glycolipid**
oil, glycolipid composition of subabul/ritha/kusum seed 1320
- Grading**
fruit, grading of 1413
- Grain**
bread/dough development, distiller's dried grain & quality of 1428
dehydrogenase activity & detn. of grain soundness 1333
diffusivity estimation & moisture diffusion in food grain 1519
mass transport equation & moisture diffusion in food grain 1518
- HCH**
wheat, HCH residues in rural stored 1347
- Haematological indices**
green leafy vegetables effect on haematological indices 1531
- Hazard**
seafood industry, HACCP for 1468
- Health**
omega-3 fatty acid in health 1496
sanitation & public health 1330
- Heat**
actomyosin, heat induced gelation of cod 1473
bread, heat treatment & sensory quality of wheat 1431
milk, phosphate/pH & heat stability of conc. 1447
rapeseed oil, squalence & heat stability of 1506
- Heat exchanger**
milk pasteurization, energy & heat exchanger fouling in 1450
- Hemicellolytic enzyme**
rye flour, hemicellolytic enzyme & rheological property of 1341
- Hen**
processing & yield/composition of spent hen surimi ayam 1467
- Horse bean**
temphi, Salmonella infantis/Escherichia coli growth in fermenting 1370
- Hydrocolloid**
olly grain & hydrocolloid 1491
- Hydrothermal treatment**
rapeseed product, hydrothermal treatment & chemical composition of 1383
- Hygiene**
meat production, hygiene in 1442
- Hypoxanthine**
fish muscle, hypoxanthine radio immunoassay/spectrophotometric analysis in 1472
- Ice cream**
ultrafiltration retentate/whey protein concentrate & quality of stored ice cream 1455
- Immunoassay**
meat product, immunoassays in 1460
- Industry**
coconut industry, diversification in 1379
seafood industry, HACCP for 1468
- Infant food**
creaming stability accelerated test of infant formula emulsion system 1479
- Insect**
bambarra groundnut/cowpea flour/protein isolate, insect infestation & composition/properties of 1368
winged bean, insect resistance biochemical basis in 1378
- Insecticide**
Sitophilus oryzae, insecticide susceptible/resistant strain of 1521
- Inulase**
brandy production from Jerusalem artichoke & inulase producing yeast 1482
- Iron**
soybean var., processing & Fe in 1388
- Irradiation**
apple/peach, UV radiation & shelf-life/ripening of 1409
- Isotachophoresis**
food product, preservative capillary isotachophoretic detn. in 1323
- Jam**
fruit content & rheological properties of sheared fruit jam 1411
- Jerusalem artichoke**
inulase producing yeast & brandy production form Jerusalem artichoke 1482
- Kaempferol**
tea, kaempferol in 1481
- Kusum**
seed oil, glycolipid composition of kusum 1320
- Labneh**
microstructure & firmness of labneh 1445
- Lactobacillus**
Ras cheese, freeze-shocked lactobacilli & flavour enhancement in 1454
- Lactobacillus casei**
cell wall proteinase purification/characterization from L. casei 1327
- Lactobacillus plantarum**

- temph, Salmonella
infantis/Escherichia coli growth
L. plantarum inhibition in
fermenting 1370
- Lactone**
stereodifferentiation of lactone
1441
- Lactose**
food ingredient, underutilized
1425
- Leafy vegetable**
green leafy vegetables effect on
haematological indices 1531
- Lecithin**
emulsifier 1332
- Legume**
phytate/extrusion cooking & iron
dialysability from legume 1369
- Lettuce**
Lactuca sativa, polyphenol
oxidase purification/properties
of 1407
- Lipase**
water binding of adsorptive
immobilized lipase 1489
- Lipid**
corn starch/cyclodextrin, lipid
peroxide & interaction of 1364
oat/wheat bran & serum/liver
lipid 1335
palm kernel oil, roasting & lipid
of 1504
peroxidation of lipid 1493 1494
squalence & heat stability of
model lipid 1506
wheat flour, emulsifying lipid &
baking quality of 1354
- Lipoxygenase**
soybean, lipoxygenase activity
detn. in 1389
- Listeria monocytogenes**
glycerol/milk components &
injury/death of frozen L.
monocytogenes 1446
- Lobster**
waste, carotenoprotein
tray-drying recovered from
lobster 1469
- Lupin**
Lupinus albus,
genetics/environment &
composition of 1376
- Lupin flour**
tolerance/acceptability of lupin
flour 1377
- Lupinus albus**
see Lupin
- Lysine**
barley, composition/properties of
high lysine 1336
- corn, protein quality of
high-lysine 1362
- Malting**
sorghum, seed
mycoflora/harvesting conditions
& malting quality of 1366
- Marketing**
fruit, marketing of 1413
snack 1427
- Masa starch**
nixtamalization/grinding
condition & starch of masa 1422
- Meat**
batters, chloride salts &
microstructure of raw meat 1458
production, hygiene/sanitary
condition in meat 1442
sulphur compound
identification/formation in meat
flavour model system 1459
- Meat product**
immunoassays in meat product
1460
soy protein for low-fat meat
product 1465
- Mechanical roasting**
sago, mechanical roasting of 1423
- Membrane**
crossflow membrane for processing
high-fouling solution 1317
fouling/cleaning of
formed-in-place membrane 1316
- Methyl bromide**
Plodia interpunctella/Ephestia
cautella, methyl bromide &
diapausing stage tolerance of
1522
- Methyl linoleate**
antioxidant natural stability of
methyl linoleate 1331
- Microbial quality**
orange juice, supercritical
carbon dioxide & microbial
quality of 1486
- Microorganism**
chocolate milk, microorganism &
aspartame degradation in 1420
citrus processing waste,
microorganism & degradation of
1417
citrus processing waste,
microorganism &
degradation/volume reduction of
1418
- Microwave**
pasta, microwave pasteurization
of filled 1436 1436
soy milk, nutritional value of
microwave treated bean based 1393
- Milk**
Listeria monocytogenes, milk
components & injury/death of
frozen 1446
characteristics of extruded
blends of non-fat dry milk with
corn flour 1444
pasteurization, energy & heat
exchanger fouling in milk 1450
phosphate/pH & heat stability of
conc. milk 1447
physical/chemical/enzymatic
manipulation of milk 1443
plasmin & UHT processed milk 1448
proteinase, processing effect on
milk 1449
- Milk powder**
delactosed high milk protein
powder 1457
- Milk protein**
delactosed high milk protein
powder 1457
- Milling**
mustard, milling & rheological
property of processed 1380
rice kernel breakage during
milling & environmental
condition 1338
sorghum, seed mycoflora & milling
quality of 1366
- Mineral**
barley, minerals of high
protein/high lysine 1336
dietary fiber & availability of
mineral 1530
wheat, Rabadi fermentation &
minerals HCl-extractability of
1349
- Moisture**
corn, moisture content of cracked
whole 1359
food grain, mass transport
equation & moisture diffusion in
1518
grain, diffusivity estimation &
moisture diffusion in 1519
soy protein isolate, moisture
sorption & gelation of
commercial 1395
turnerite, temp. & moisture
adsorption isotherms of ground
1508
- Monoglyceride**
wheat starch, monoglyceride &
pasting temp./viscosity of 1356
- Musa paradisiaca**
see Plantain
- Muscle**
pork, muscle tocopherol & quality
of 1463
- Mushroom**

- Clitocybe multiceps*, nutrient in wild 1329
- pork sausage, mushroom & quality of 1328
- Mustard**
milling & rheological property of processed mustard 1380
storage & rheological property of processed mustard 1381
- Nectarine**
cell wall material composition of ripening nectarine 1412
- Nisin**
yoghurt manufacture & nisin 1456
- Noodle**
Indian 1427
descriptive analysis scaling method & sensory evaluation of noodle 1512
- Nugget**
pork nugget, shelf-life of raw/cooked fiber formulated 1461
- Nutrient**
Clitocybe multiceps, nutrient in wild 1329
- Nutritional value**
chickpea cvs, nutritional value of 1372
extruded corn gritt-quinoa blend nutritional value of 1360
palm oil, nutritional value of 1502
soy milk, nutritional value of microwave treated bean based 1393
- Oat**
fiber, serum cholesterol reduction by oat 1337
- Oat bran**
lipid/colonic physiology & oat bran 1335
- Odour**
sorting, multidimensional scaling model derived from odour 1510
- Oil**
biotechnology & modification of oil 1492
constraints in edible oil usage 1499
speciality oil 1497
- Oilseed**
genotype/location & tocopherol content of oilseed 1498
- Oncorhynchus mykiss**
see Rainbow trout
- Onion**
wheat flour, onion extract & rheological properties/breadmaking characteristics of 1433
- Orange juice**
manufacture/properties of fermented permeate/orange juice based beverage 1480
pasteurization & ascorbic acid degradation/pectinesterase inactivation in orange juice 1487
supercritical carbon dioxide & microbial quality of orange juice 1486
- Organic acid**
banana fruit, organic acid in ethanol/ethylene treated 1416
- Oxidation**
lipid, peroxidation of 1493 1494
starch, oxidation & rheological properties of rice/corn 1340
- Packaging**
fruit, packaging of 1413
- Palm oil**
nutritional value of palm oil 1502
pressing extraction of palm oil 1501
recent developments in palm oil 1503
roasting & lipid/sugars/amino acid of palm kernel oil 1504
- Pasta**
microwave pasteurization of filled pasta 1436
sensory evaluation/colour measurement of pasta 1437
- Pasteurization**
milk pasteurization, energy & heat exchanger fouling in 1450
orange juice, pasteurization & ascorbic acid degradation/pectinesterase inactivation in 1487
pasta, microwave pasteurization of filled 1436
- Pasting**
wheat starch, lipid & pasting temp. of 1358
- Pastry**
saccharose & baking technology/sensory quality of pastry 1435
- Patties**
buffalo fat premix & quality of patties 1466
- Pea**
temph, *Salmonella* infantis/*Escherichia coli* growth in fermenting 1370
- Peach**
ultraviolet radiation & shelf-life/ripening of peach 1409
- Pearl millet**
Pennisetum typholdeum, fermentation & phytate/polyphenolic content/starch in-vitro digestibility/protein of 1365
- Pearl millet protein**
fermentation & protein of pearl millet 1365
- Pearl millet starch**
fermentation & starch digestibility of pearl millet 1365
- Pectic enzyme**
storage stability of pectic enzyme preparation 1326
- Pectinesterase**
apple waste, pectinesterase from Brambley 1414
orange juice, pasteurization & pectinesterase inactivation in 1487
- Permeate**
beverage, manufacture/properties of fermented permeate/fruit juice based 1480
- Pest control**
CO₂pressurized for pest control 1524
- Phaseolus vulgaris**
see Cranberry bean
- Pheromone**
corn stores, pheromones for trapping *Prostephanus truncatus* in 1357
- Phosphate**
milk, phosphate & heat stability of conc. 1447
potato starch, phosphate ester & crystallinity of 1403
- Phosphine**
water/temp. & phosphine release from aluminium phosphide-containing formulation 1520
wheat, fungal growth/survival in phosphine fumigated 1346
- Phospholipid**
catfish diet effect on platelet phospholipid/blood clotting in healthy men 1471
- Physical property**
soy milk, physical properties of 1394
- Phytate**
legume, phytate & iron dialysability from 1369
pearl millet, fermentation & phytate of 1365
rapeseed, phytate/protein interaction in 1382
soybean, radiation/soaking & phytate content of 1390

Phytic acid

- rapeseed flour, phytic acid analysis modified method in 1384

Plantain

- pulp, pretreatment & texture/ascorbic acid content of frozen plantain 1408

Plasmin

- milk, plasmin & UHT processed 1448

Pleurotus tuber-regium

- see Mushroom

Plodia interpunctella

- methyl bromide & diapausing stage tolerance of *Plodia interpunctella* 1522

Polypeptide

- sunflower seed albumin, polypeptide of 1397

Polyphenol

- pearl millet, fermentation & polyphenol content of 1365

Polyphenol oxidase

- Lactuca sativa*, polyphenol oxidase purification/properties of 1407

Polysaccharide

- protein-polysaccharide interaction, role of 1527

Popping

- sorghum, seed mycoflora/harvesting conditions & popping quality of 1366

Pork

- muscle tocopherol & quality of pork 1463
- nugget, shelf-life of raw/cooked fiber formulated pork 1461
- patties, sensory analysis of fiber formulated ground pork 1462
- sausage, mushroom/spice & quality of pork 1328

Potato starch

- phosphate ester & crystallinity of potato starch 1403
- ultrafiltration of potato starch 1404

Preservative

- food product, preservative capillary isotachophoretic detn. in 1323

Pressing

- palm oil, pressing & extraction of 1501

Processing

- chocolate milk, processing & aspartame degradation in 1420
- fufu, processing & quality/acceptability of low cyanide cassava based 1401

- milk proteinase, processing effect on 1449

- soybean var., processing & Fe in 1388

- state diagram for food processing/development 1315
- surimi ayami, processing & yield/composition of spent hen 1467

Protein

- barley, composition/properties of high protein/high lysine 1336
- biochemical/nutritional characteristics of non-conventional protein sources 1525
- chemical surface influences on protein adsorption kinetics 1321
- role of protein-polysaccharide interaction 1527

Proteinase

- Lactobacillus casei*, cell wall proteinase purification/characterization from 1327
- milk proteinase, processing effect on 1449

Proteins fish

- plasma butyryl cholinesterase activity in rats fed diet containing fish protein 1474

Proteins milk

- characteristics of extruded blends of milk protein raffinade 1444

Pullanase

- corn starch, pullanase & hydrolysis of waxy 1363

Puri

- wheat/composite flour based puri 1438

Quality

- bread/dough development, distillers dried grain & quality of 1428
- catfish, storage quality of iced channel 1475
- cereal based food, DLG quality test of 1334
- Chinese steamed roll, quality evaluation of 1439
- food, photon emission scanning method for quality detn. of 1319
- fufu, processing & quality of low cyanide based 1401
- ice cream, ultrafiltration retentate/whey protein concentrate & quality of stored 1455
- patties, buffalo fat premix &

- quality of 1466

- pork, muscle tocopherol & quality of 1463

- rabbit meat, skinning/curing & quality of 1464

- wheat, quality of durum 1352

Quercetin

- tea, quercetin rhamnoglucosides in 1481

Quinoa

- extruded corn grit-quinoa blend 1360
- extruded corn grit-quinoa blend, physical properties of 1361

Rabadi

- wheat, Rabadi fermentation & minerals HCl-extractability of 1349

Rabbit

- meat, skinning/curing & quality of rabbit 1464

Radiation

- food, radiation & analysis of 1322
- soybean, radiation & phytate content of 1390

Rainbow trout

- Oncorhynchus mykiss* muscle, post-mortem tenderisation of rainbow trout 1476

Rapeseed

- phytate/protein interaction in rapeseed 1382

Rapeseed flour

- phytic acid analysis modified method in rapeseed flour 1384

Rapeseed oil

- squalence & heat stability of rapeseed oil 1506

Rapeseed product

- hydrothermal treatment/ethanol extraction & chemical composition of rapeseed product 1383

Rapeseed protein

- extraction/ultrafiltration/ /diafiltration & preparation of rapeseed protein 1505
- phytate/protein interaction in rapeseed 1382
- polyanion/rapeseed protein interaction 1385

Ras cheese

- freeze-shocked lactobacilli & flavour development in 1454

Retentate

- ice cream, ultrafiltration retentate & quality of stored 1455

Rheological property

- dairy product, structure &

rheology of 1440
 flavoured gel, rheological property of 1509
 jam, fruit content & rheological property of sheared fruit 1411
 mustard, millings rheological property of processed 1380
 mustard, storage & rheological property of processed 1381
 rye flour, hemicellolytic enzyme & rheological property of 1341
 starch,
 oxidation/carboxymethylation & rheological properties of rice/corn 1340
 wheat dough, rheological properties assessment of 1350
 wheat flour, onion extract & rheological properties of 1433
Rhizopus
 properties of *Rhizopus* gluco-amylase 1325
Rice
 environmental condition & rice kernel breakage during milling 1338
Rice flour
 sev preparation from defatted blended Bengal gram flour-soy flour-rice flour 1371
Rice starch
 oxidation/carboxymethylation & rheological properties of rice starch 1340
Ripening
 apple/peach, UV radiation & ripening of 1409
 nectarine, cell wall material composition of ripening 1412
Ritha
 seed oil, glycolipid composition of ritha 1320
Roasting
 palm kernel oil, roasting & lipid/sugars/amino acid of 1504
 sago, mechanical roasting of 1423
Roll
 Chinese steamed roll, production standardisation/quality evaluation of 1439
Rye flour
 hemicellolytic enzyme & rheological property of rye flour 1341
Saccharification
 vinegar, saccharification & production of rice 1339
Saccharose
 pastry, saccharose & baking technology/sensory quality of

1435
Safety
 communicating strategies risk to public 1534
Sago
 mechanical roasting of sago 1423
Sal seed starch
 physicochemical properties of sal seed starch 1388
Salmon
 platelet phospholipid/blood clotting in healthy men, salmon diet effect on 1471
Salmonella infantis
 temph, *S. infantis* growth in fermenting 1370
Salted food
 fish, browning of salted sun-dried 1470
Sanitation
 food safety & public health 1330
 meat production, sanitation in 1442
Sardina pilchardus
 see *Sardine*
Sardine
 Sardina pilchardus, smoking & fatty acid composition of frozen sardine 1477
Sausage
 pork sausage, mushroom/spice & quality of 1328
Seafood
 industry, HACCP for seafood industry 1468
Sensory evaluation
 contrast & evaluation of panel inconsistency 1513
 durum wheat product, sensory evaluation of 1437
 extruded corn grit-quinoa blend, sensory evaluation of 1360
 modifications to sensory difference test protocols 1514
 noodle, descriptive analysis scaling method & sensory evaluation of 1512
 pork patties, sensory analysis of fiber formulated ground 1462
Sensory perception
 flavoured gel, sensory perception of 1509
Sensory property
 sensory properties of craved/aversive food 1515
Sensory quality
 bread, sour sough/heat treatment & sensory quality of wheat 1431
 consumer & sensory quality 1516
 pastry, saccharose & baking

technology/sensory quality of 1435
Sev
 Bengal gram flour-soyflour-rice flour defatted blended sev 1371
Shelf-life
 Camembert cheese, shelf-life of modified 1452
 apple/peach, UV radiation & shelf-life of 1409
 nisin & shelf-life of yoghurt 1456
 pork nugget, shelf-life of raw/cooked fiber-formulated 1461
 sponge-cake, water vapour sorption hysteresis/shelf-life of industrial 1434
Shorea robusta
 see *Sal seed*
Sitophilus granarius
 Acorus calamus oil effect on *S. granarius* 1523
Sitophilus oryzae
 Acorus calamus oil effect on *S. oryzae* 1523
 insecticide susceptible/resistant strain of *S. oryzae* 1521
 wheat, *S. oryzae* & *Asp. flavus* infection/aflatoxin contamination in stored 1345
Skinning
 rabbit meat, skinning & quality of 1464
Smoking
 sardine smoking & fatty acid composition of frozen 1477
Snack
 Indian snack food 1427
Soaking
 soybean, soaking & phytate content of 1390
Soft drink
 optimization of soft drink 1511
Sorghum
 Sorghum bicolor seed mycoflora/harvesting conditions & quality of 1366
Sorghum bicolor
 see *Sorghum*
Sour dough
 bread, sour dough & sensory quality of wheat 1431
Soy curd
 preparation, soy milk blended with buffalo milk for soy curd 1392
Soy flour
 sev preparation from defatted blended Bengal gram flour-soy flour-rice flour 1371
Soy milk

- nutritional value of microwave treated bean based soy milk 1393
- physical/chemical characteristics of soy milk 1394
- soy curd preparation, soy milk blended with buffalo milk for 1392
- Soy protein**
- emulsion, soy protein isolate concn. & stability of 1396
- isolate, moisture sorption & gelation of commercial soy protein 1395
- meat products, soy protein for low-fat 1465
- protein extractability of dielectric heated soybean 1387
- Soybean**
- defatted soya grits, extrusion texturing of 1391
- functional properties/protein extractability of dielectric heated soybean 1387
- lipooxygenase activity detn. in soybean 1389
- radiation/soaking & phytate content of soybean 1390
- var., processing & Fe in soybean 1388
- Spice**
- antiplatelet factors in spice 1507
- pork sausage, spice & quality of 1328
- Stability**
- emulsion, soy protein isolate concn. & stability of 1396
- infant formula emulsion system, creaming stability accelerated test of 1479
- methyl linoleate, antioxidant natural stability of 1331
- milk, phosphate/pH & heat stability of conc. 1447
- pectic enzyme preparation, storage stability of 1326
- rapeseed oil, squalene & heat stability of 1506
- Staling**
- bread, carbohydrate & staling in enzyme-supplemented 1430
- Standardisation**
- Chinese steamed roll, production standardisation of 1439
- Steamed bread**
- China, steamed bread from 1429
- Storage**
- catfish, storage quality of iced channel 1475
- ice cream, ultrafiltration retentate/whey protein concentrate & quality of stored 1455
- mustard, storage & rheological property of processed 1381
- pectic enzyme preparation, storage stability of 1326
- turnip, colour change in waxed stored 1402
- wheat, *Sitophilus oryzae* & *Aspergillus* infection/aflatoxin contamination in stored 1345
- wheat, fenoxycarb long-term protectant of stored 1344
- Strawberry juice**
- manufacture/properties of fermented permeate/strawberry juice based beverage 1480
- Subabul**
- seed oil, glycolipid composition of subabul 1320
- Sucrose**
- deliquescent behaviour & sucrose 1419
- toxicity of sucrose fatty acid polyesters 1533
- Sugar**
- food product, sugar crystallization in 1424
- Sugars**
- banana fruits, sugars in ethanol/ethylene treated 1416
- fruits, sugars in Bangladesh 1410
- palm kernel oil, roasting & sugars of 1504
- Sulphur**
- meat flavour model system, sulphur compound identification/formation in 1459
- Sunflower**
- seed albumin, polypeptides of sunflower 1397
- Tea**
- Camellia sinensis*, kaempferol/quercetin rhamnoglucosides in tea 1481
- Technology**
- agro-food production/processing technologies in India 1314
- Temperature**
- time-temp. indicator 1318
- Temph**
- Salmonella infantis*/*Escherichia coli* growth in fermenting temph 1370
- Tenderisation**
- rainbow trout muscle, post-mortem tenderisation of 1476
- Texture**
- carrot tissue, textural changes in processed 1399
- plantain pulp, pretreatment & texture of frozen 1408
- soya grits, extrusion texturing of defatted 1391
- wedge fracture test for food texture measurement 1517
- Tocopherol**
- oilseed, genotype/location & tocopherol content of 1498
- pork, muscle tocopherol & quality of 1463
- quantitative detn. of tocopherol 1528
- Tolerance**
- lupin flour, tolerance of 1377
- Toxicity**
- fatty acid mixture, toxicity of 1495
- sucrose fatty acid polyesters, toxicity of 1533
- Tribolium castaneum**
- corn grain breakage & population increase in *Tr. Castaneum* 1358
- Turmeric**
- temp. & moisture adsorption isotherms of ground turmeric 1508
- Turnip**
- colour change in waxed stored turnip 1402
- UHT milk**
- plasmin & UHT processed milk 1448
- Ultrafiltration**
- carboxyl methyl starch, ultrafiltration of 1404
- rapeseed protein, ultrafiltration & preparation of 1505
- Vateria indica**
- see Dhupa seed
- Vegetable**
- cooking & fibre content of vegetables 1406
- cooking method & β -carotene content of vegetable 1405
- fibre content/composition in commonly consumed Indian vegetables 1398
- Vicin**
- faba bean flour, bacteria & vicin degradation in 1375
- Vinegar**
- production of rice vinegar 1339
- Viscosity**
- wheat starch, granule surface material & viscosity of 1355
- wheat starch, lipid & viscosity of 1356
- Vitamin**
- processed food, vitamin-additive in 1532
- Waste**
- apple waste, pectinesterase from

Brambley 1414
citrus processing waste,
microorganism & degradation of
1417

lobster waste, carotenoprotein
tray-drying recovered from 1469

Water binding

lipase, water binding of
adsorptive immobilized 1489

Water vapour sorption

sponge-cake, water vapour
sorption hysteresis/shelf-life
of industrial 1434

Weaning food

formulation,
development/evaluation of
weaning food 1478

Wheat

biotin bioavailability in wheat
1348

colour measurement of durum
wheat/milled durum wheat
product
1351

colour measurement/quality of
durum wheat 1352

DDT/HCH residues in rural stored
wheat 1347

deoxynivalenol/3-acetyl-
-deoxynivalenol in wheat kernel
1342

fenoxycarb long-term protectant
of stored wheat 1344
fungal growth/survival in
phosphine fumigated wheat 1346
Fusarium-damaged wheat kernel
1343

Rabadi fermentation & minerals
HCl-extractability of wheat 1349
Sitophilus oryzae & Asp. flavus
infection/aflatoxin
contamination in stored wheat
1345

Wheat bran

lipid/colonic physiology & wheat
bran 1335

Wheat flour

Pb/Cd binding flour to gluten in
wheat flour 1353
emulsifying lipid & baking
quality of wheat flour 1354
onion extract & rheological
properties/breadmaking
characteristics of wheat flour
1433

puri based on wheat flour 1438

Wheat product

sensory/colour measurement of
durum wheat product 1437

Wheat starch

granule surface material &
viscosity of wheat starch 1355
lipid & rheological properties of
wheat starch 1356

Whey protein concentrate

ice cream, whey protein
concentrate & quality of stored
1455

Wine

bentonites cation adsorption in
synthetic wine 1488

Winged bean

Psophocarpus tetragonolobus
insect resistance biochemical
basis in winged bean 1378

Yeast

inulase producing yeast & brandy
production from Jerusalem
artichoke 1482

Yoghurt

microstructure & firmness of
labneh 1445

**NATIONAL INFORMATION CENTRE FOR FOOD SCIENCE
AND TECHNOLOGY, CFTRI, MYSORE - 570 013**

Also subscribe to our other periodicals

1. FOOD DIGEST (Quarterly)

This is oriented towards the information needs of food industries, trade and marketing personnel, entrepreneurs, decision makers and individuals engaged in food field.

Annl Subn: Indian Rs. 150/- Foreign \$. 65/-

2. FOOD PATENTS (Quarterly)

Gives world patent information on Food Science and Technology taken from national and international sources. Abstracts are provided for food patents registered in India.

Annl Subn: Indian Rs. 100/- Foreign \$. 50/-

ANNOTATED BIBLIOGRAPHIES

Aseptic packaging (1983-85)* Beet Molasses (1959-1988)* Cassava (1977-1986)* Cassava Starch (1976-1986)* Cocoa Flavour and Aroma* Cultured Milk (1977-1986)* Energy Conservation in Food and Allied Industries (12 Parts)* Ethanol Production (1976-1986)* Extruded Food and Machinery (1968-1986) 4 volumes* Food Grains (Publications of CFTRI and DFRL, Mysore)* Fumaric acid (1969-1988)* Indian sweets (1969-1987)* Instant Noodles (1970-1985)* Instant tea* Khoa (1969-1987)* Lemon juice (1978-1987)* Lemon oils (1978-1987)* Lemon pectin (1978-1987)* Papad (1969-1987)* Pomegranate (1969-1987)* Potato starch (1977-1986)* Rice and Wheat Quality (World Literature) 1987 (Rice quality 1969-1986; Wheat Quality 1975-1986)* Rice Bran and Rice Bran Oils (1970-1980) (1983)* Soy Sterols (1969-1988)* Tamarind Gums (1969-1987)* UHT-Milk (Spoilage) (1975-1988)*

The cost of each bibliography or per part or per volume is Rs.50.00. Postage is extra.

For details, please write to:

The Area Co-ordinator

FOSTIS,

CFTRI

Mysore - 570 013, India

ISSN 0253-4924

Regd. No. 36729/84